Historical Trends in Stream Discharge at Long-Term Gaging Stations in Idaho

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U.S. Geological Survey

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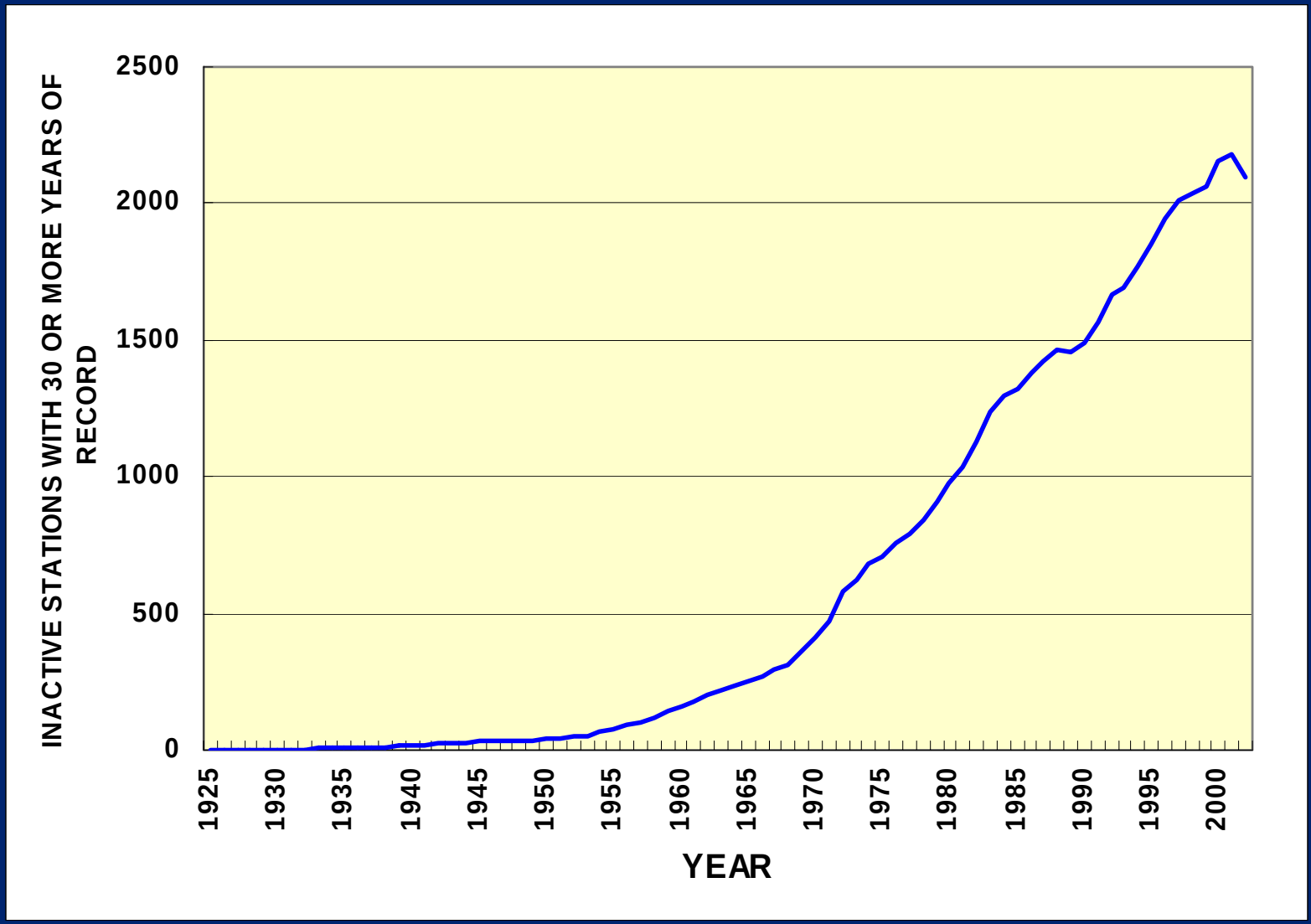
Cumulative Number of Discontinued Long-Term Gaging Stations Nationwide, 1925-2003



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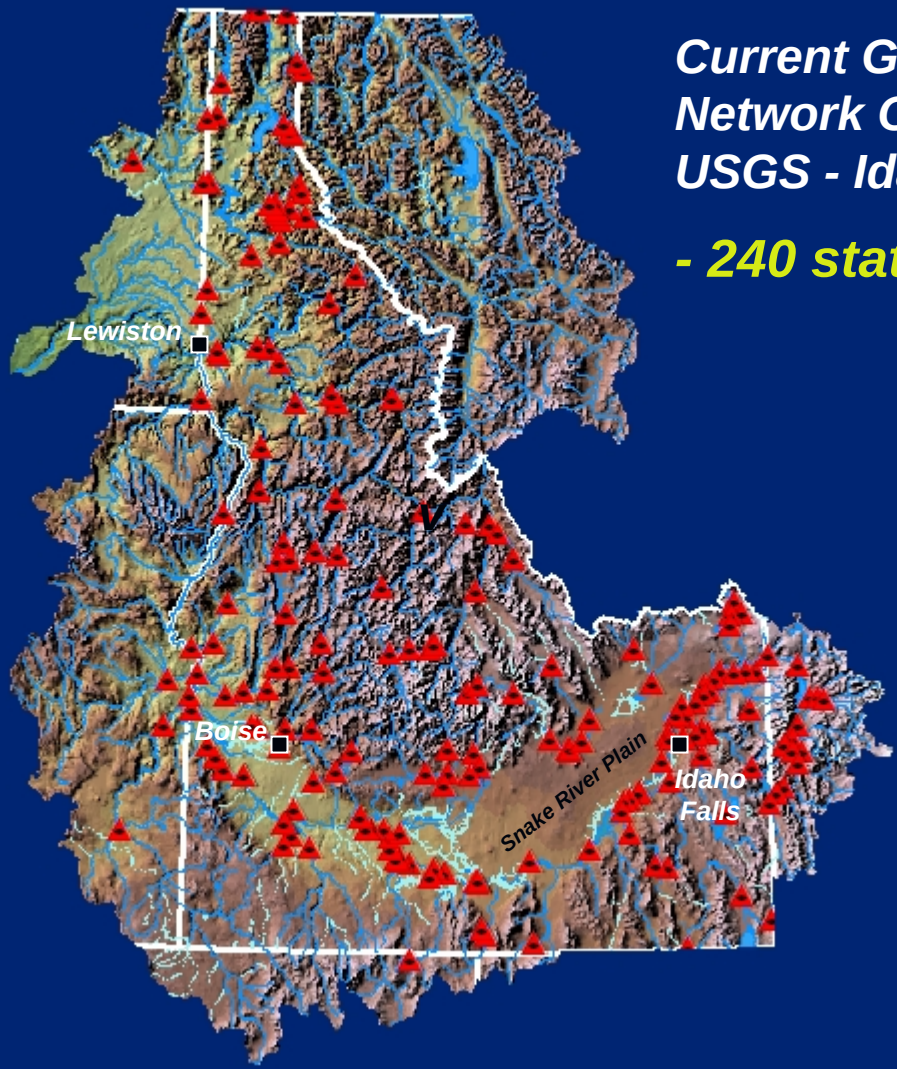

Current Gaging Station Network Operated by the USGS - Idaho District.

- 240 stations

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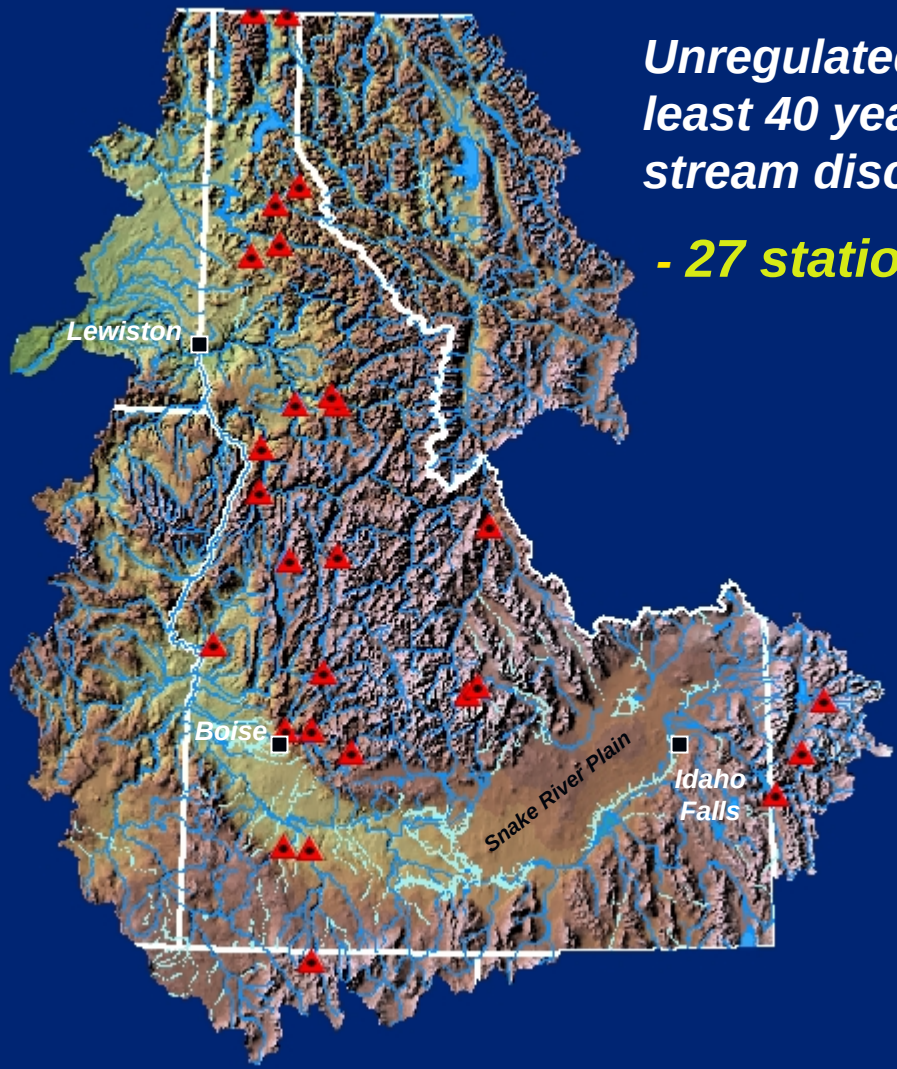

Unregulated streams with at least 40 years of continuous stream discharge information

- 27 stations

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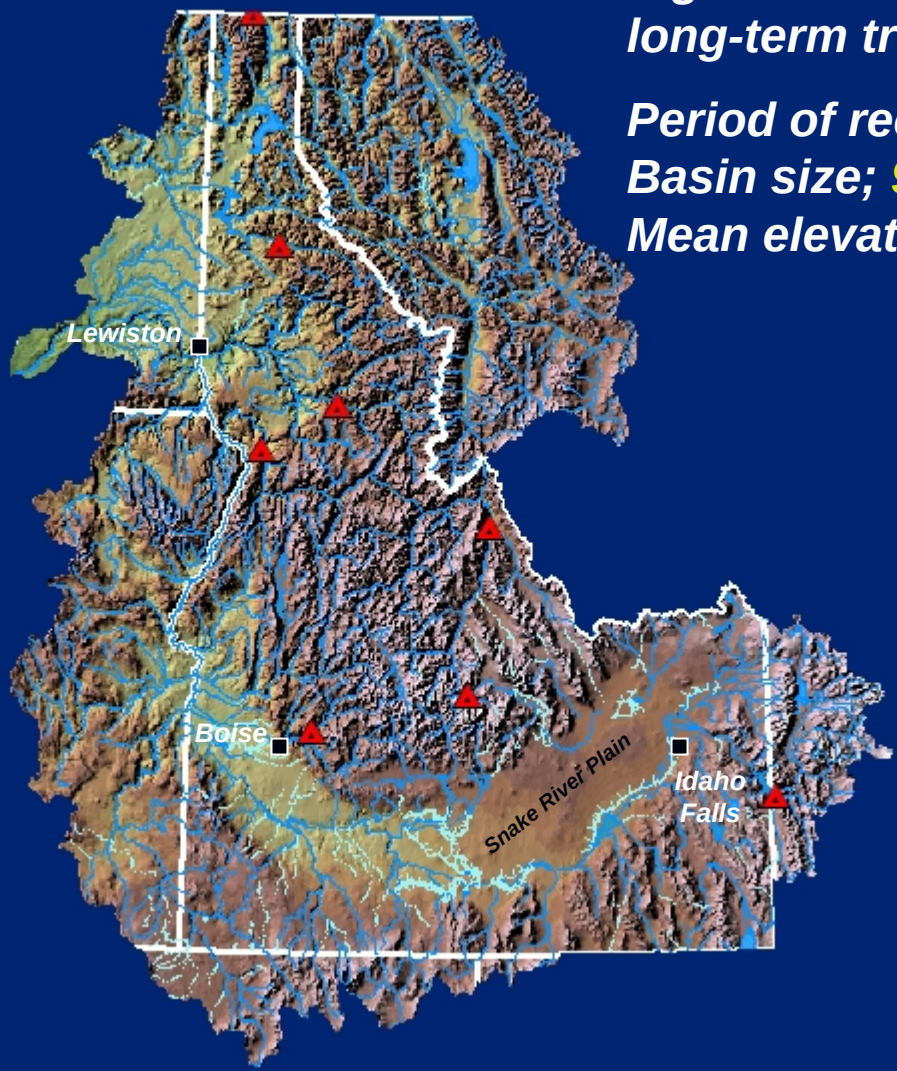

Eight stations used to evaluate long-term trends in discharge

Period of record; 50 – 92 years
Basin size; 97 – 13,550 mi²
Mean elevation; 4,480 – 8,660 ft

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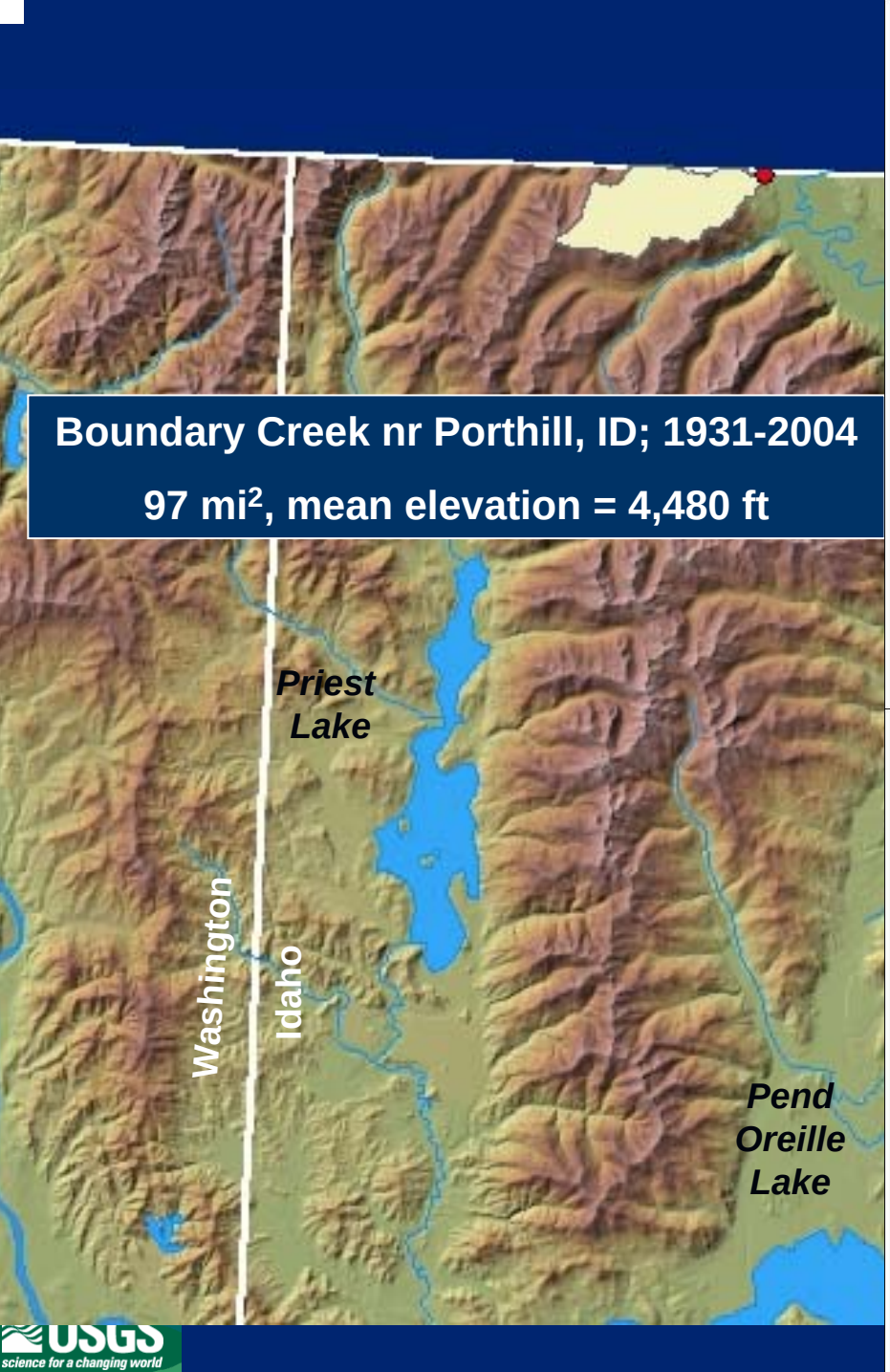
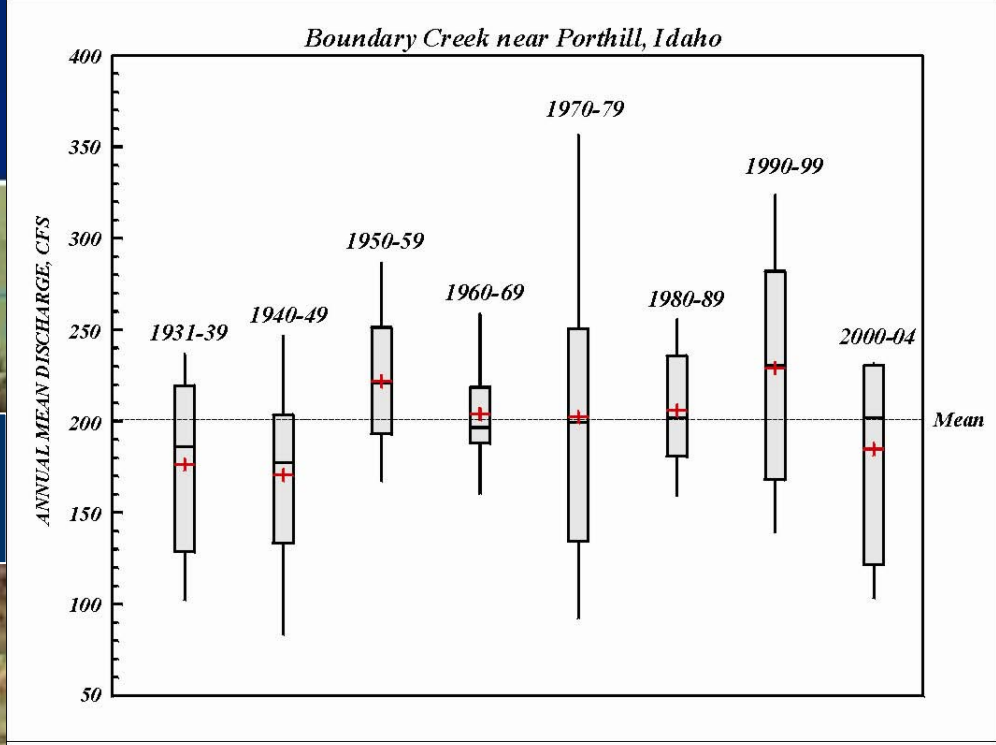
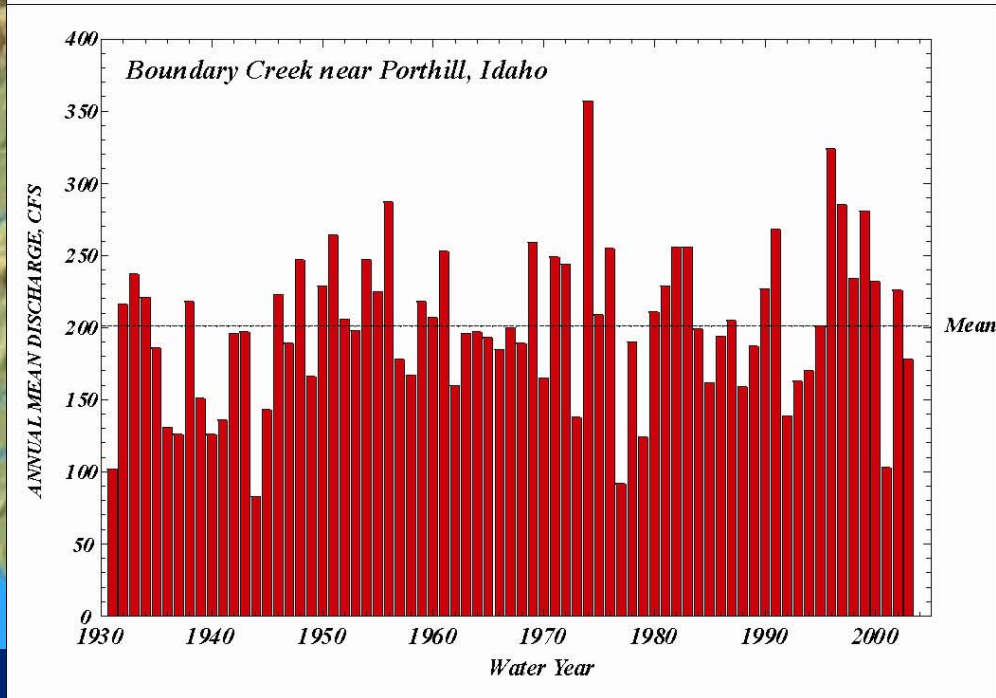
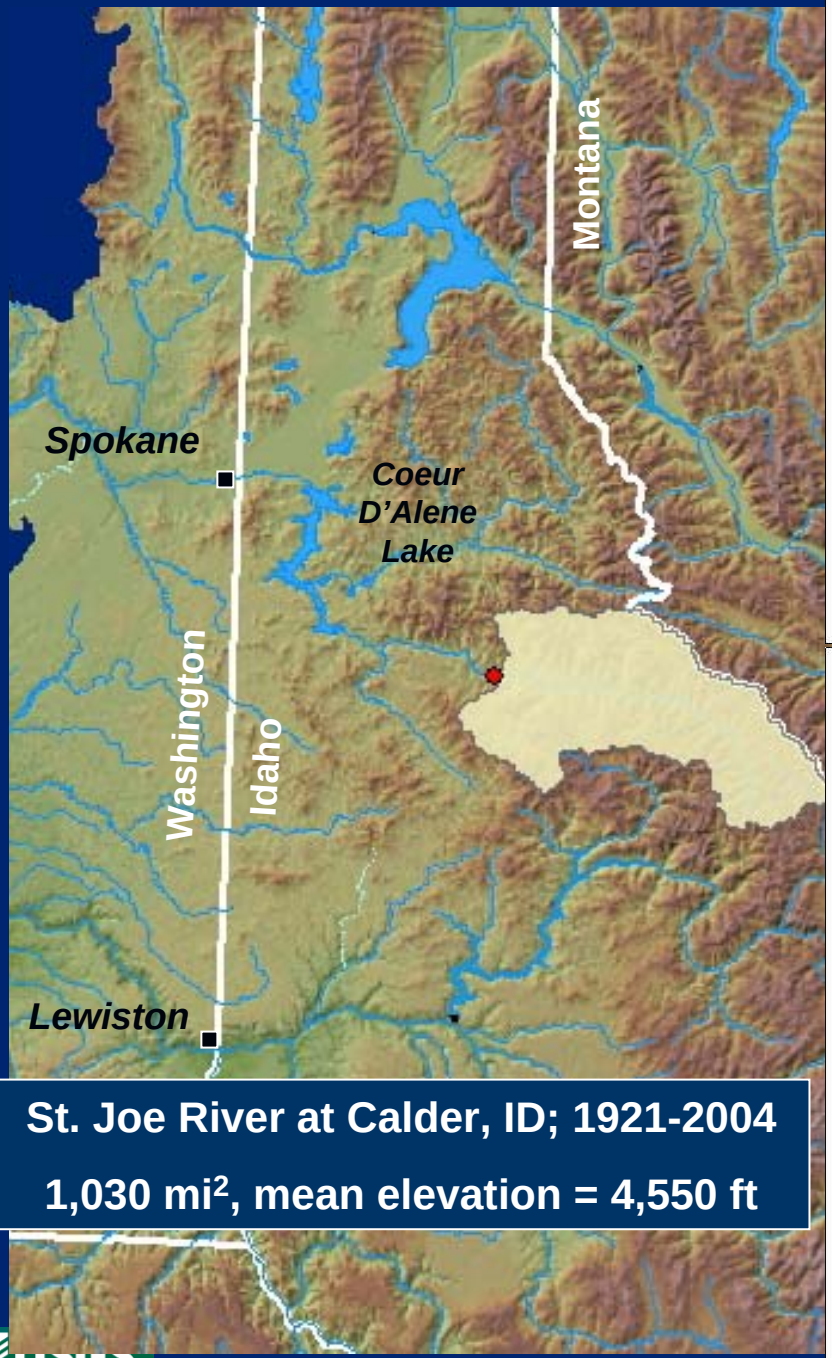

Boundary Creek nr Porthill, ID; 1931-2004
97 mi², mean elevation = 4,480 ft
Priest Lake
Washington
Idaho
Pend Oreille Lake

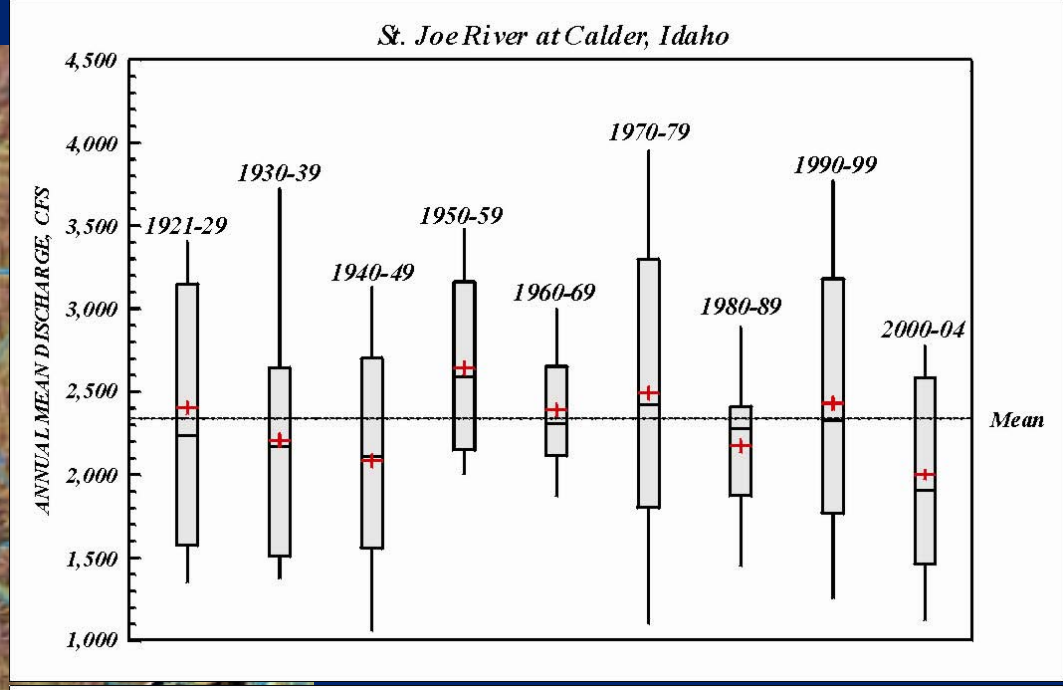

Boundary Creek near Porthill, Idaho
ANNUAL MEAN DISCHARGE, CFS
400
350
300
250
200
150
100
50
1931-39
1940-49
1950-59
1960-69
1970-79
1980-89
1990-99
2000-04
Mean

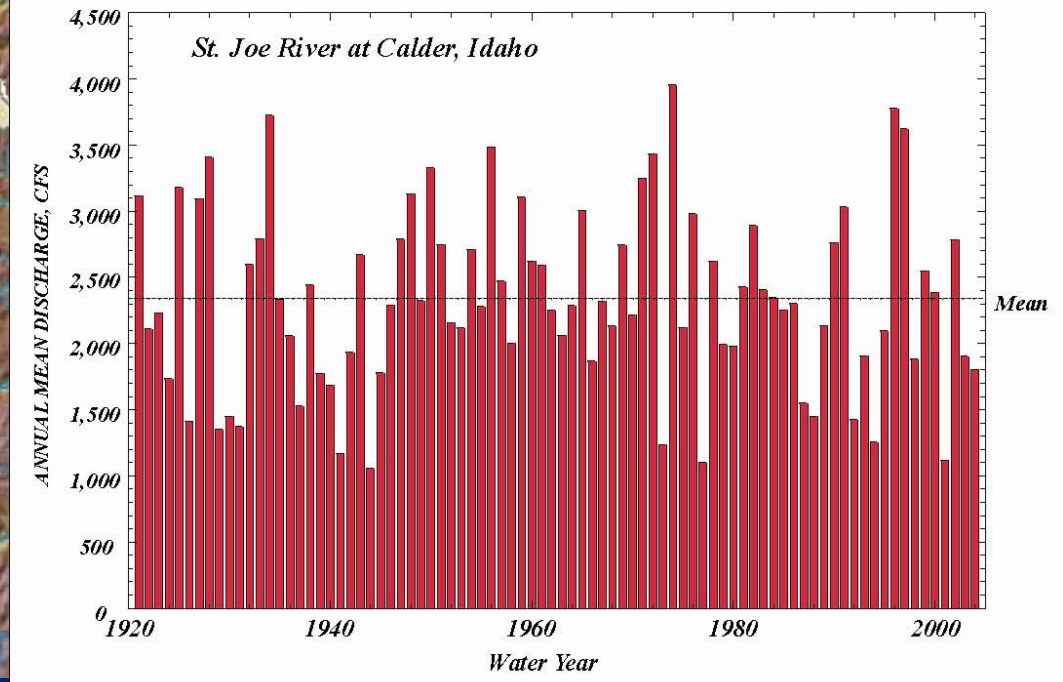

Boundary Creek near Porthill, Idaho
ANNUAL MEAN DISCHARGE, CFS
400
350
300
250
200
150
100
50
0
1930
1940
1950
1960
1970
1980
1990
2000
Water Year
Mean

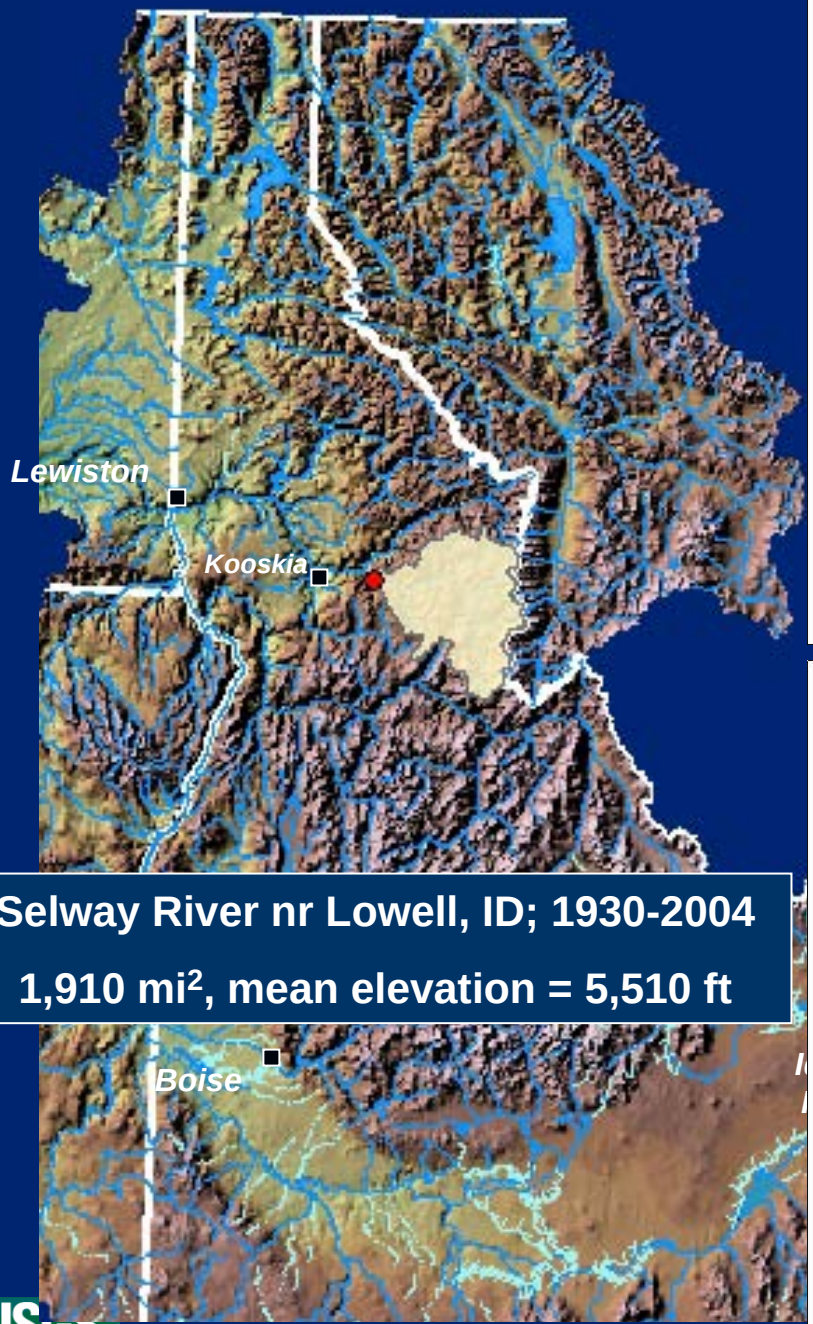


St. Joe River at Calder, ID; 1921-2004

1,030 mi², mean elevation = 4,550 ft

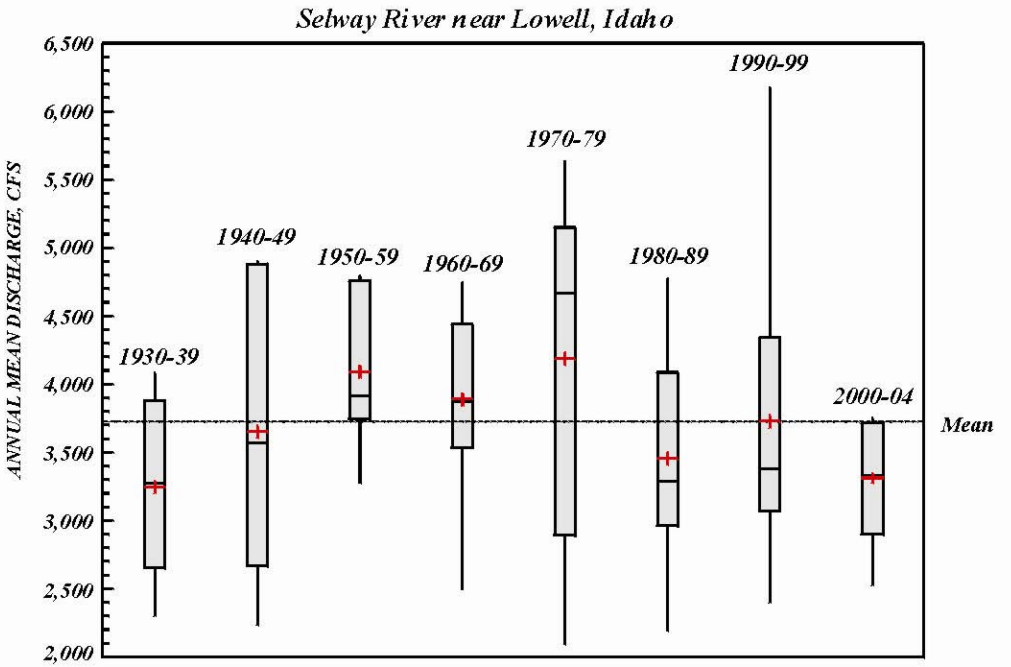


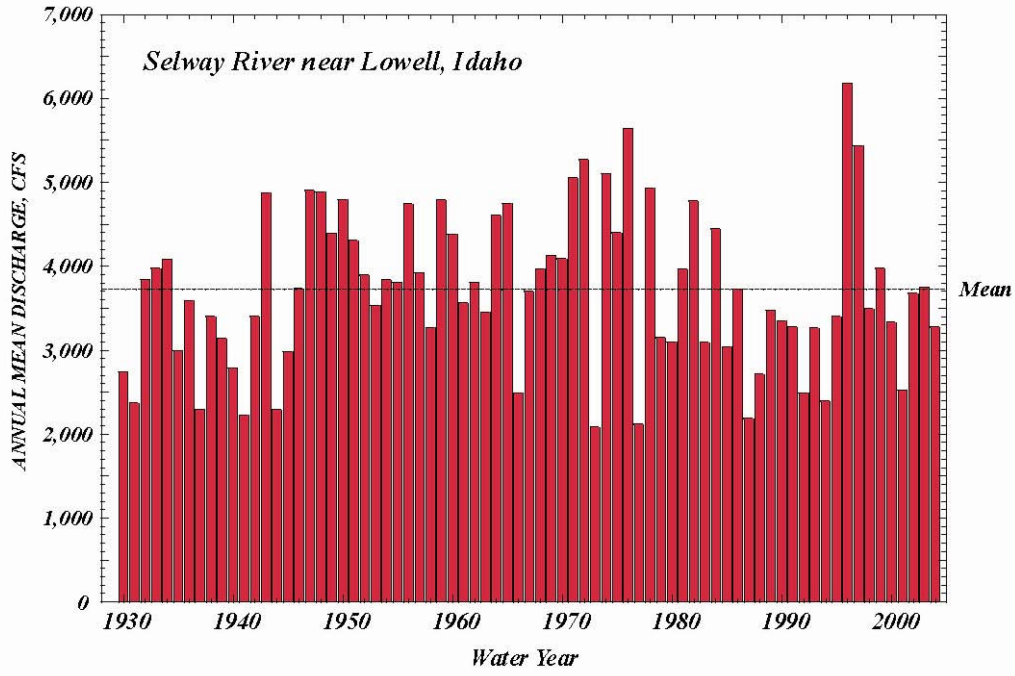




Selway River nr Lowell, ID; 1930-2004

1,910 mi², mean elevation = 5,510 ft





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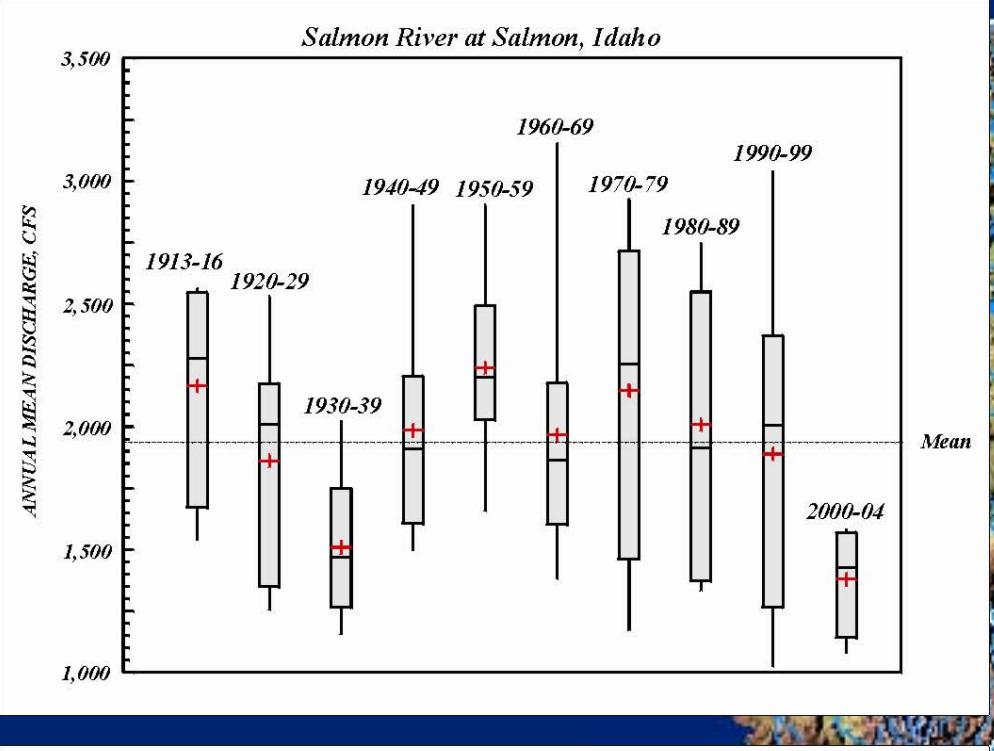
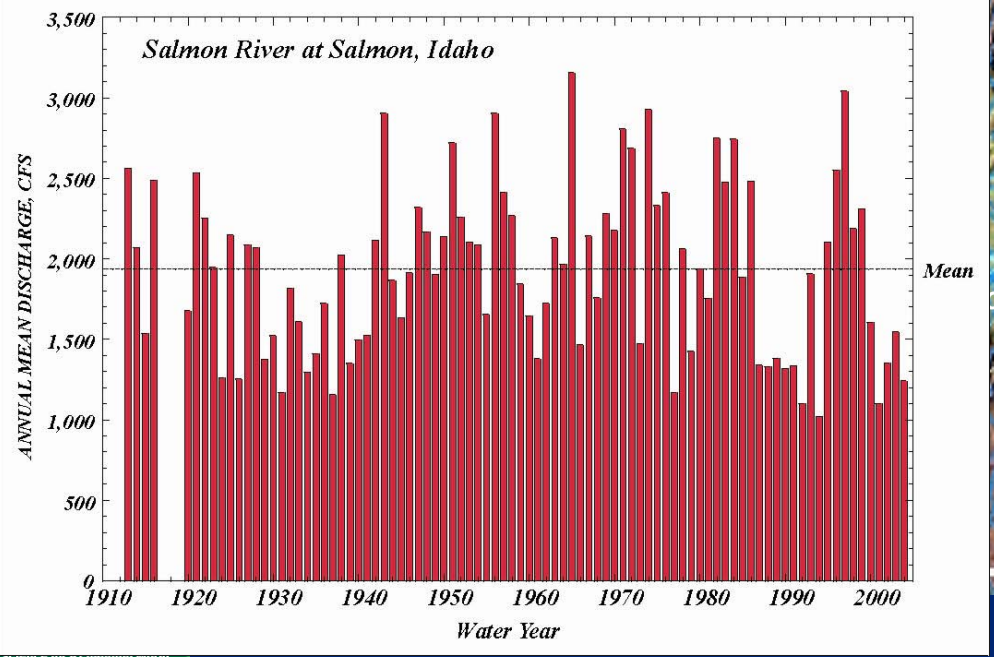
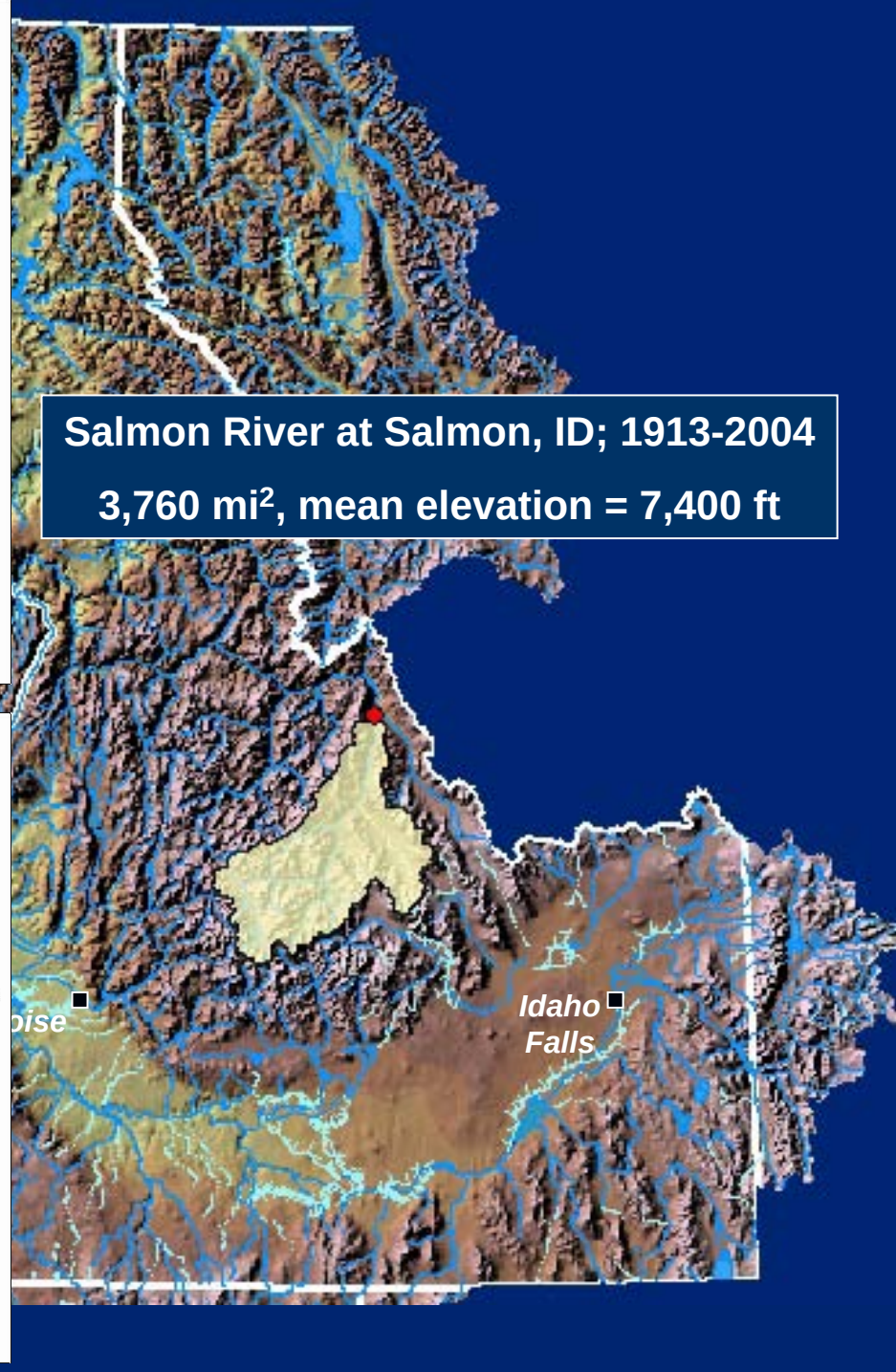
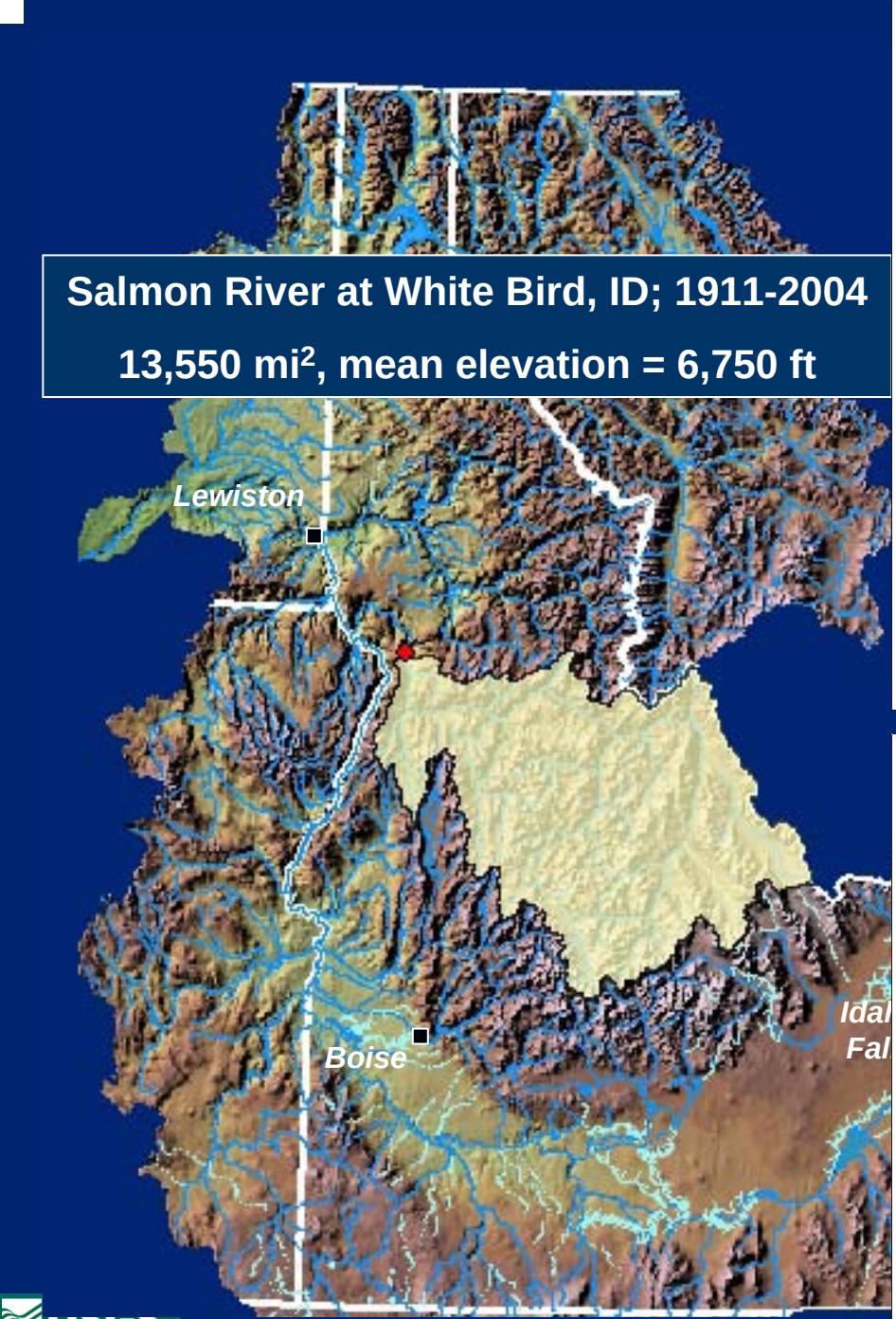
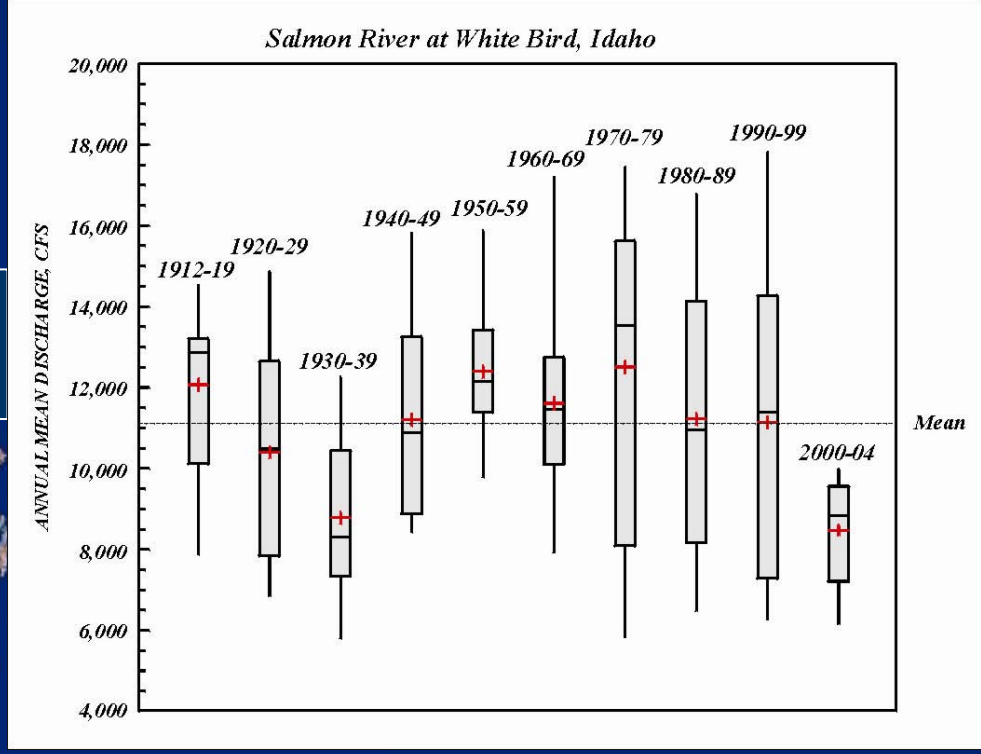
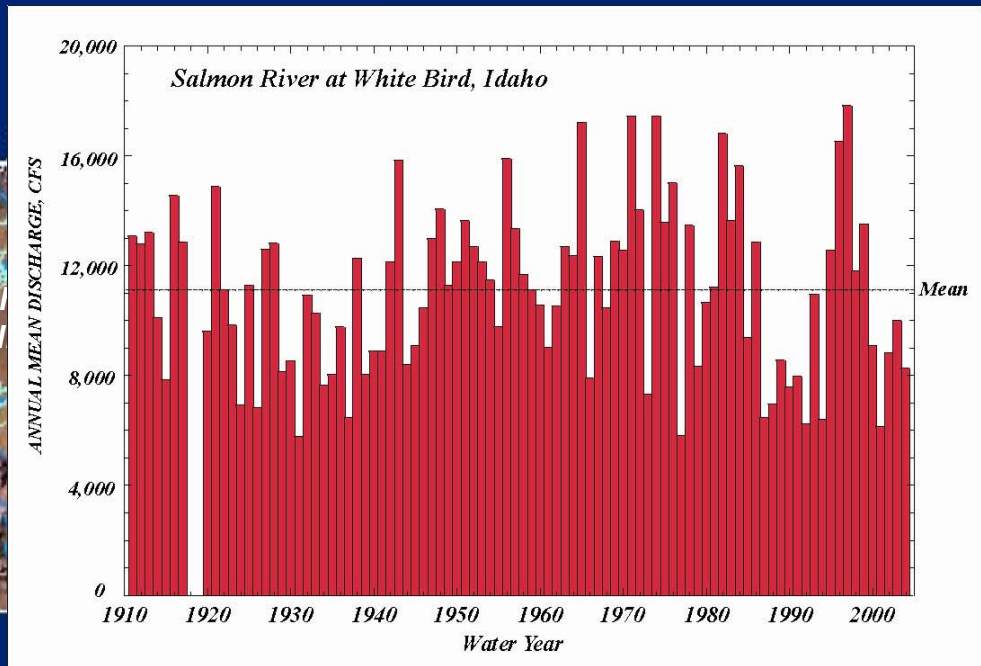

Salmon River at Salmon, Idaho
ANNUAL MEAN DISCHARGE, CFS
3,500
3,000
2,500
2,000
1,500
1,000
1913-16
1920-29
1930-39
1940-49
1950-59
1960-69
1970-79
1980-89
1990-99
2000-04
Mean


Salmon River at Salmon, Idaho
ANNUAL MEAN DISCHARGE, CFS
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
Water Year
Mean


Salmon River at Salmon, ID; 1913-2004
3,760 mi², mean elevation = 7,400 ft
Idaho Falls







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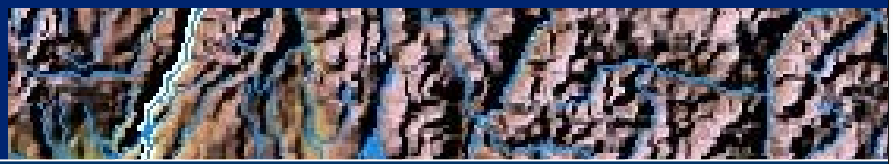
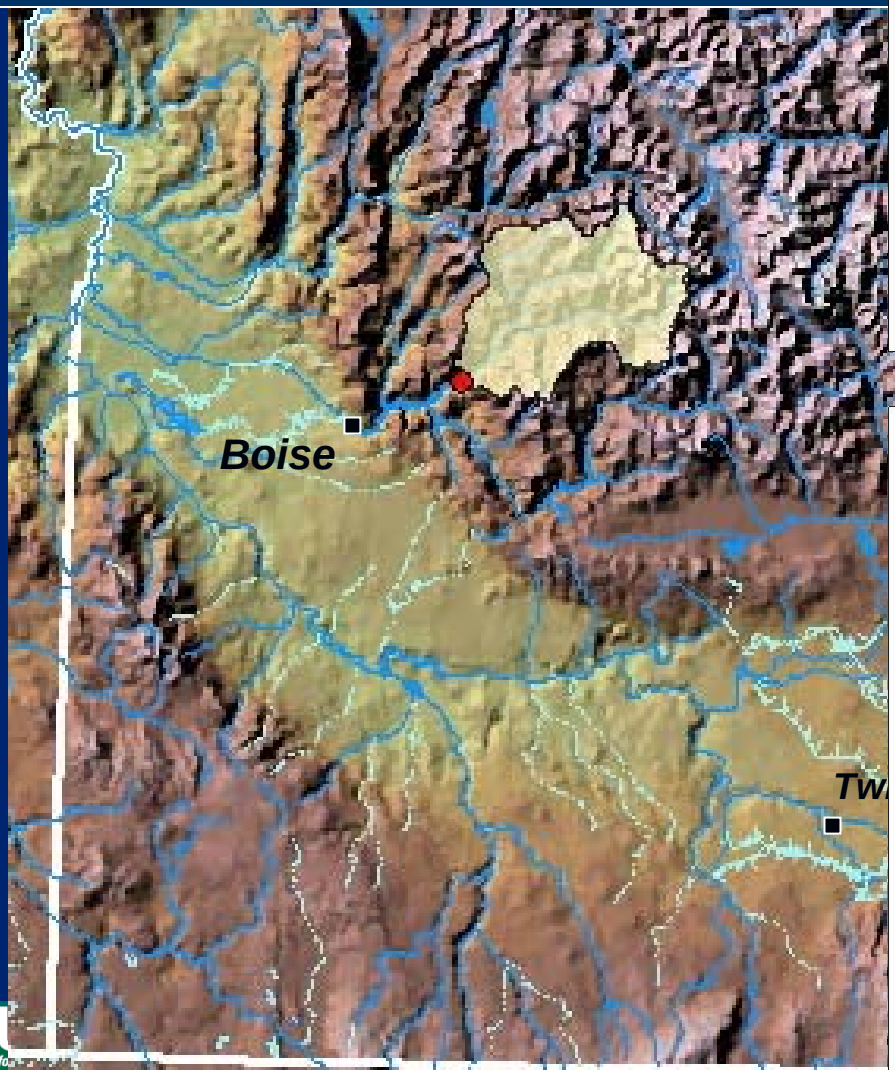
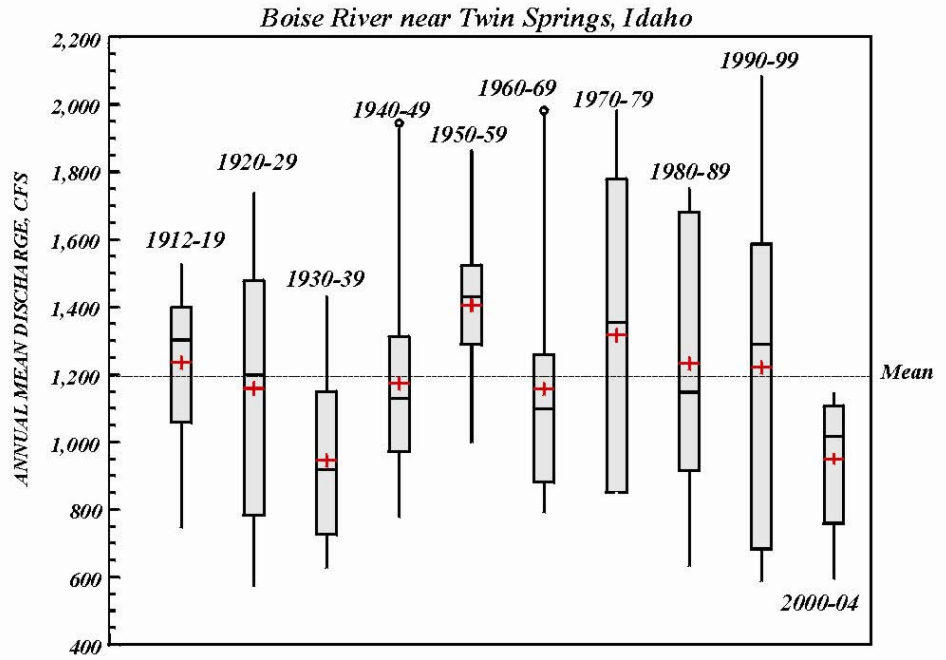
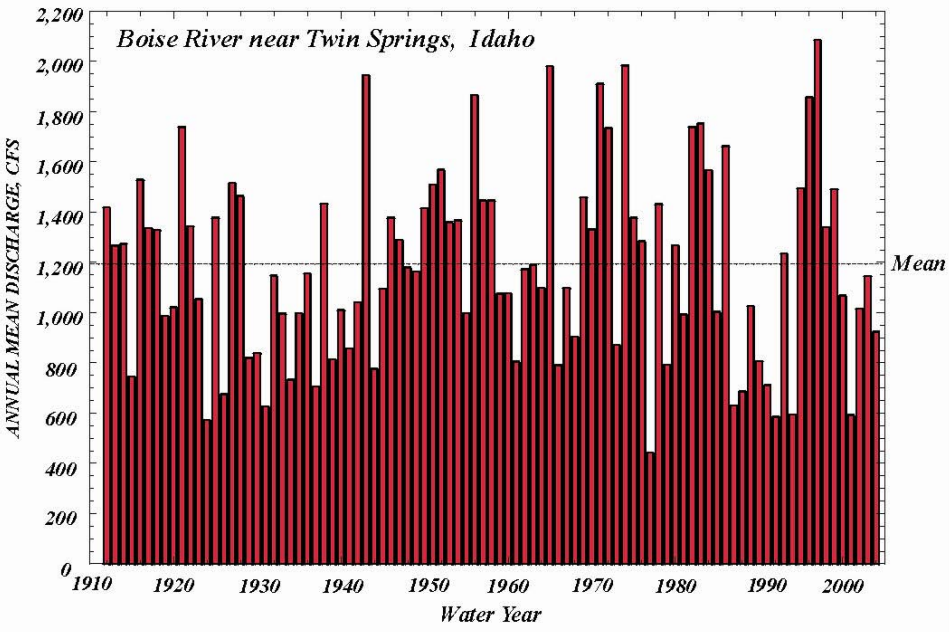


Boise River near Twin Springs, ID; 1912-2004

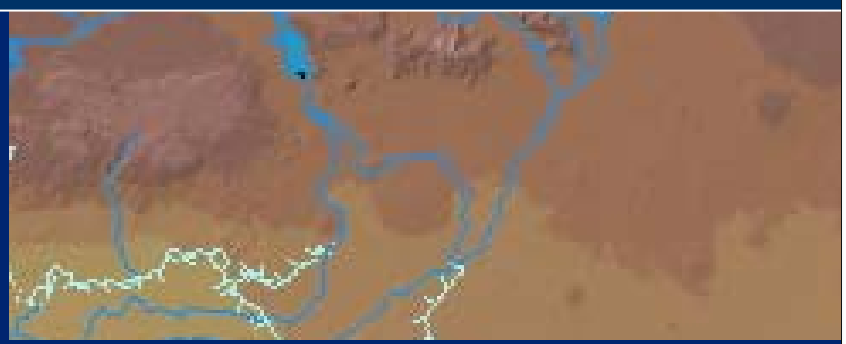
830 mi², mean elevation = 6,420 ft

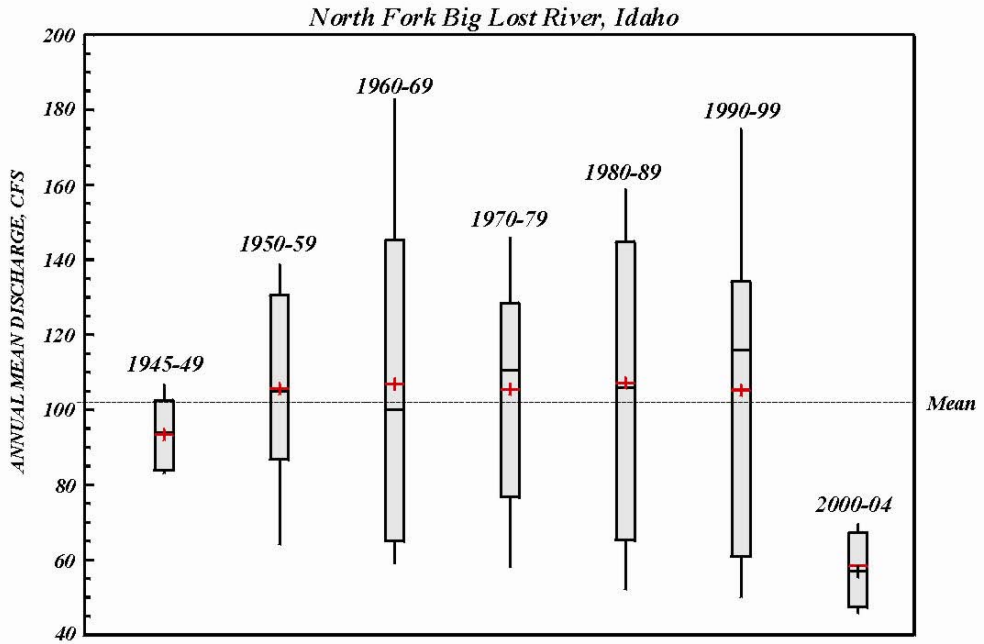


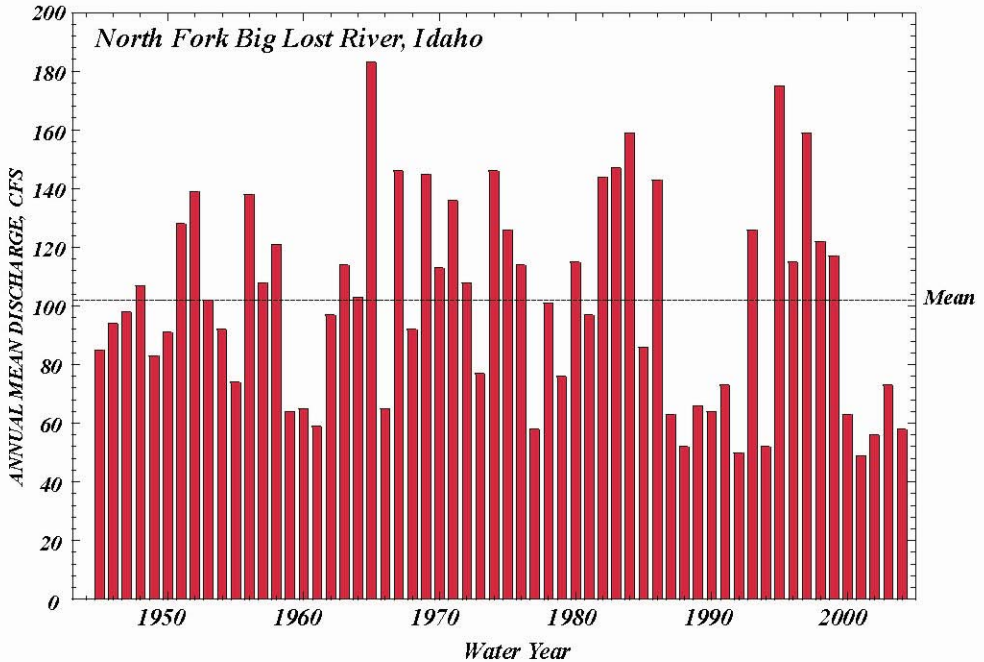




North Fork Big Lost River, ID; 1931-2004
114 mi², mean elevation = 8,660 ft







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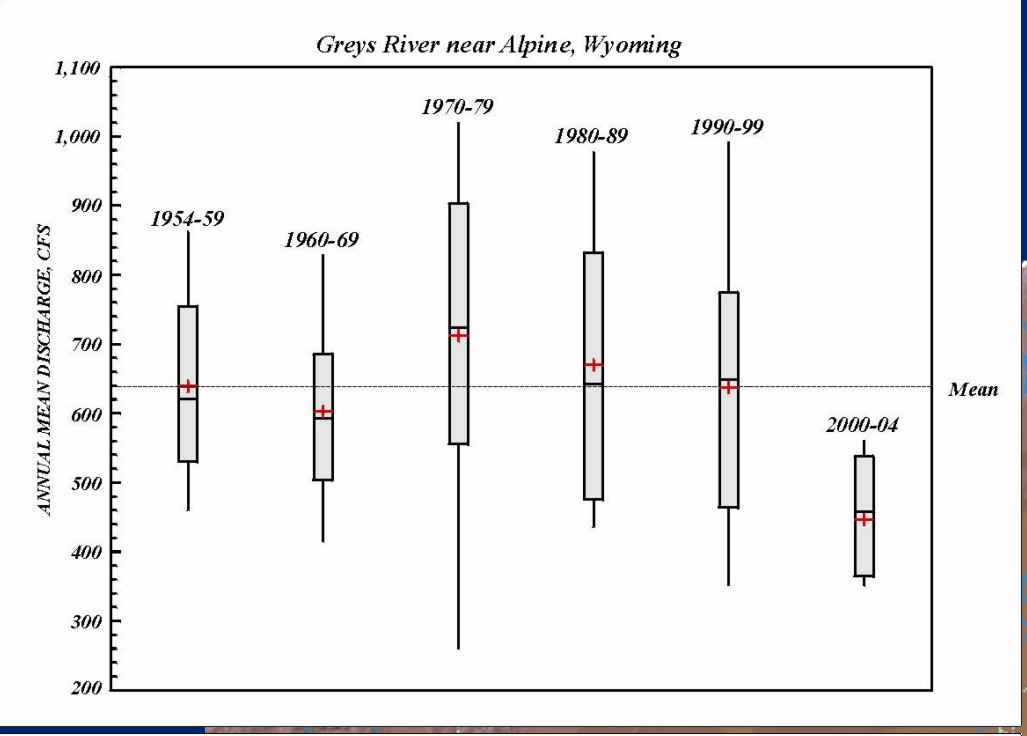
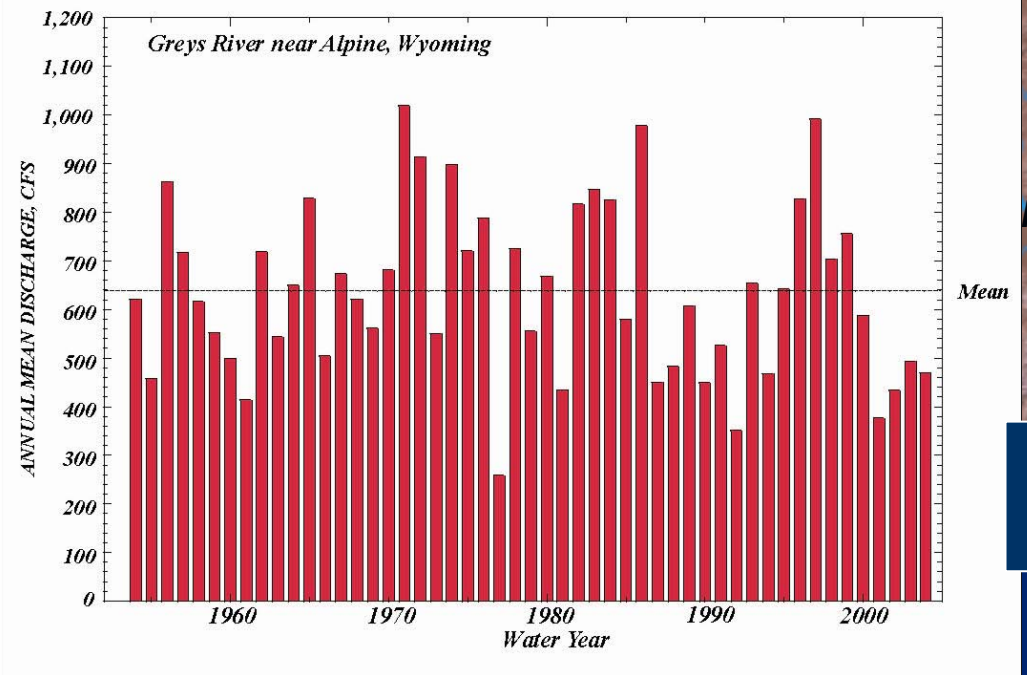
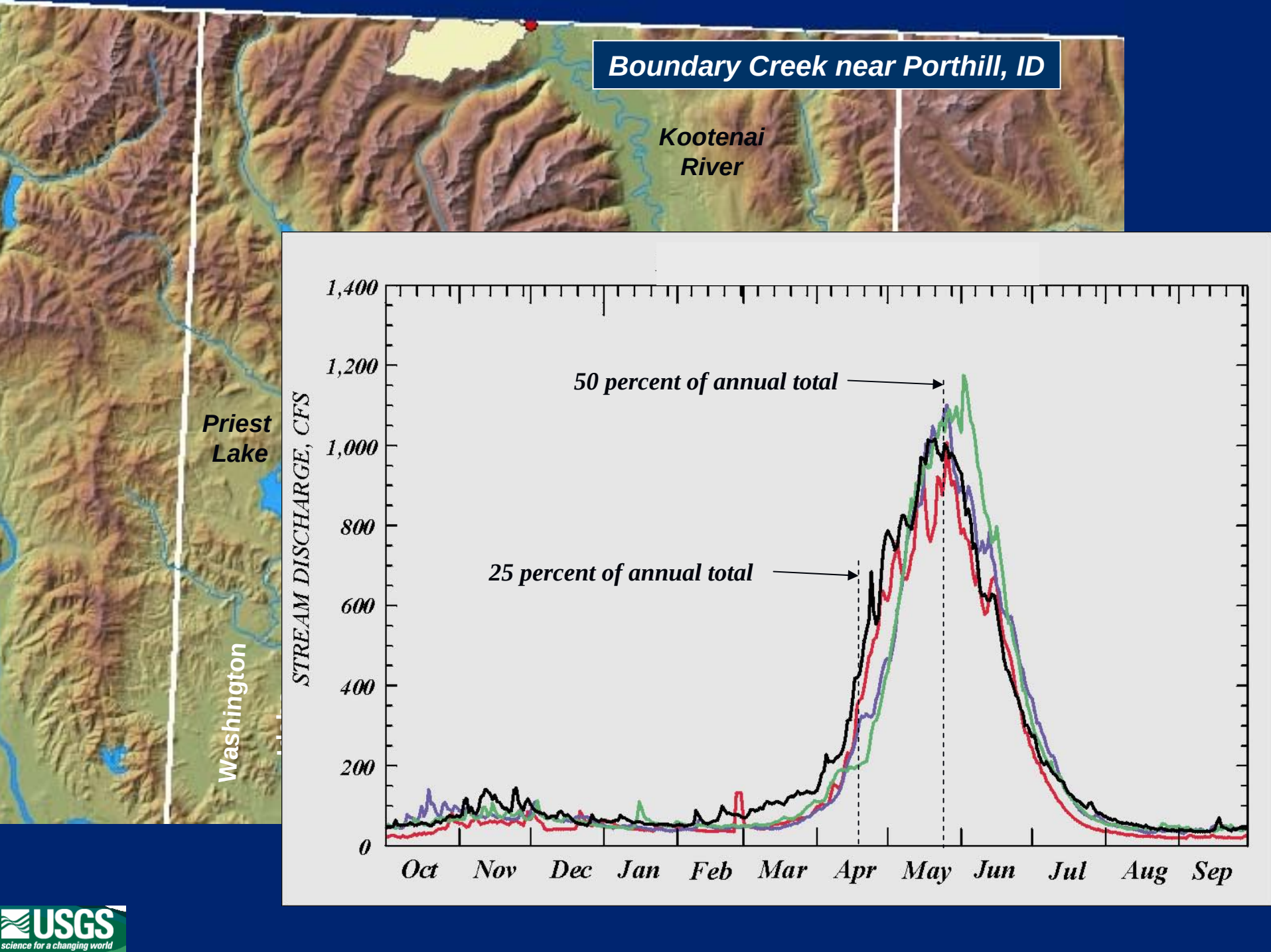
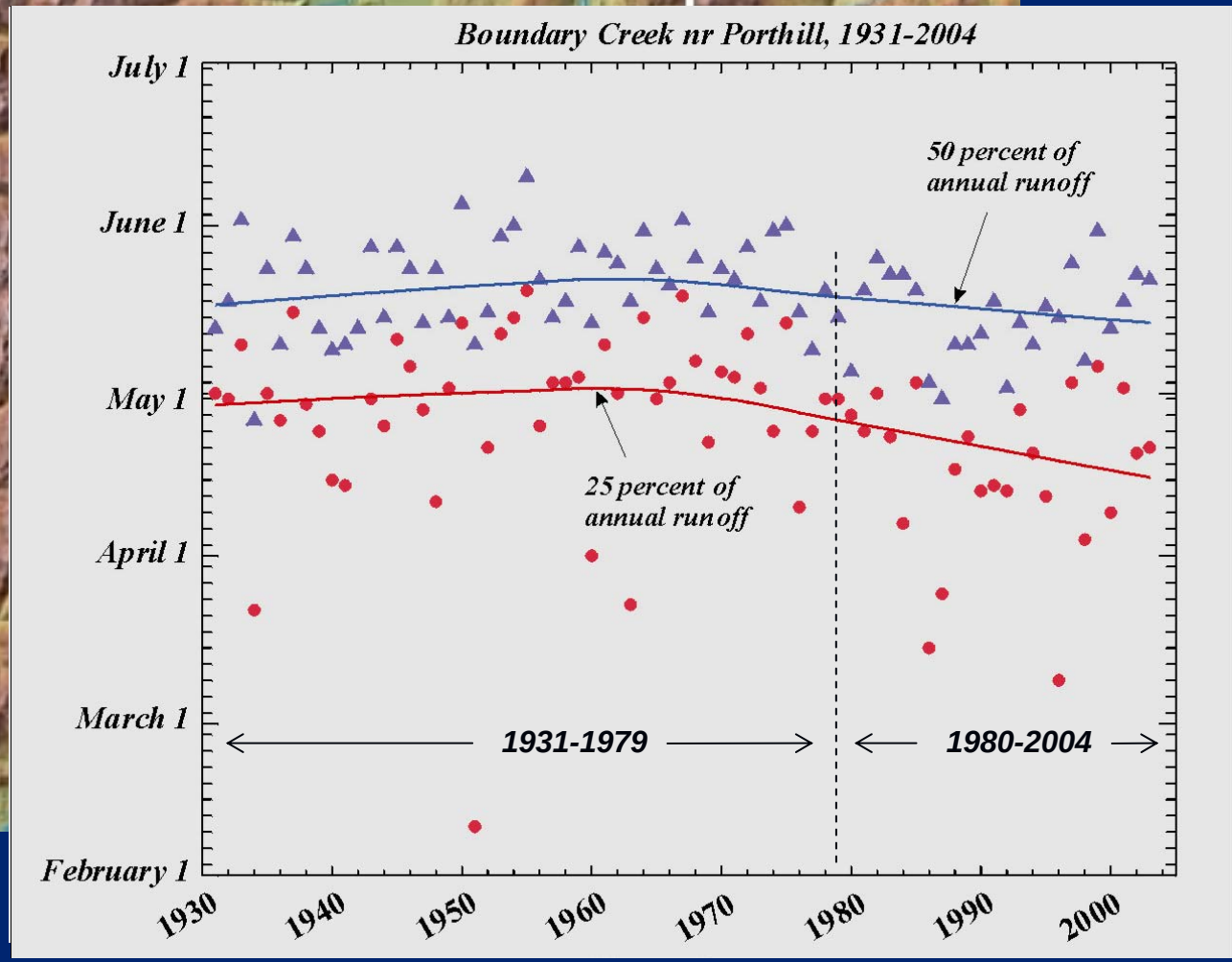




Greys River near Alpine, WY; 1954-2004

448 mi^2, mean elevation = 8,100 ft


Boundary Creek near Porthill, ID
Kootenai River
Priest Lake
Washington
STREAM DISCHARGE, CFS
1,400
1,200
1,000
800
600
400
200
0
50 percent of annual total
25 percent of annual total
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep



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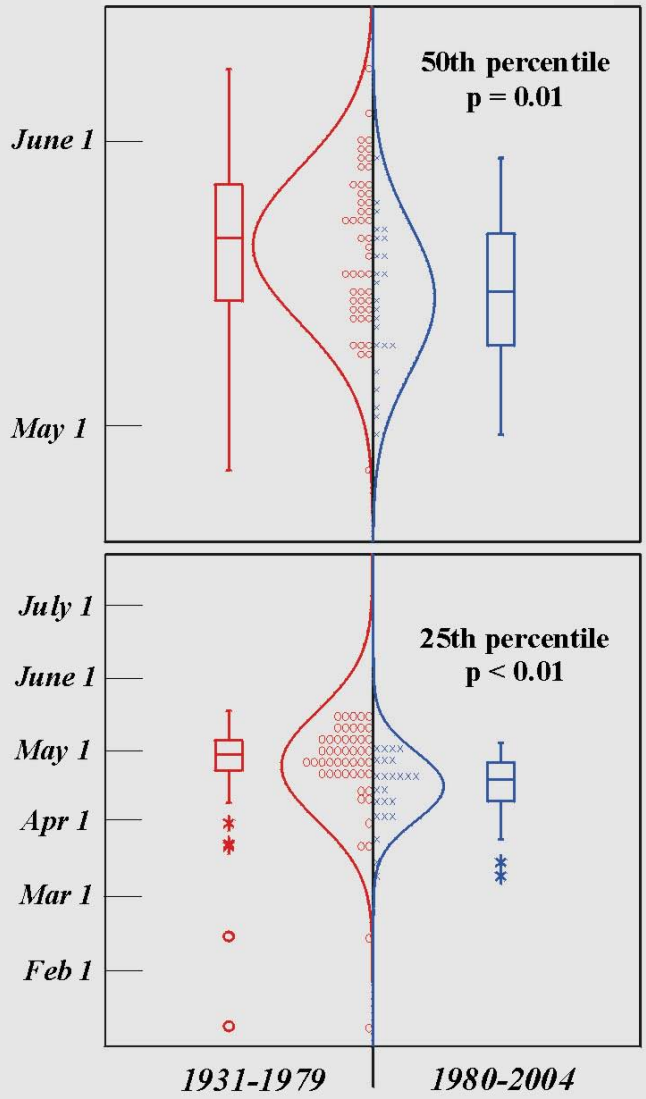
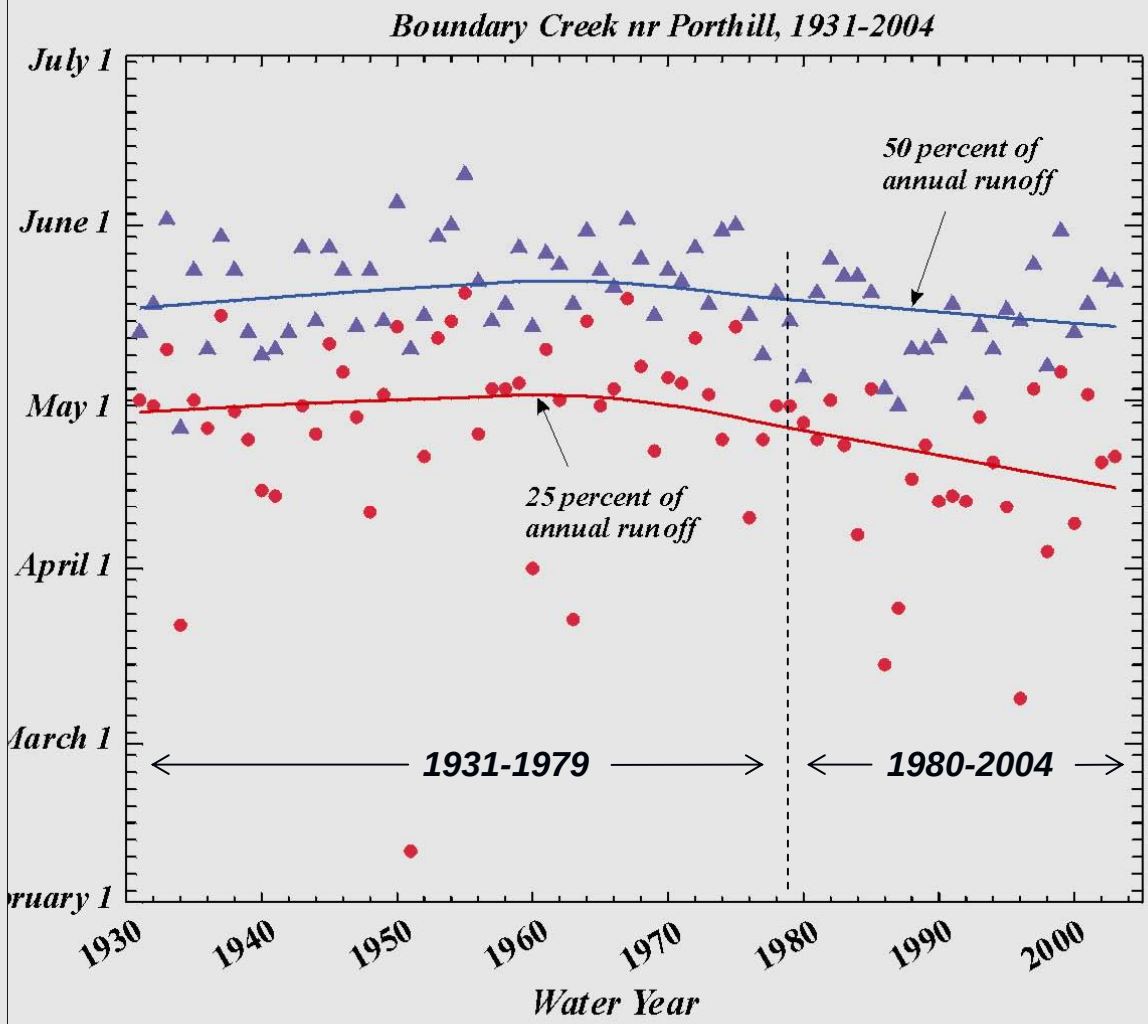
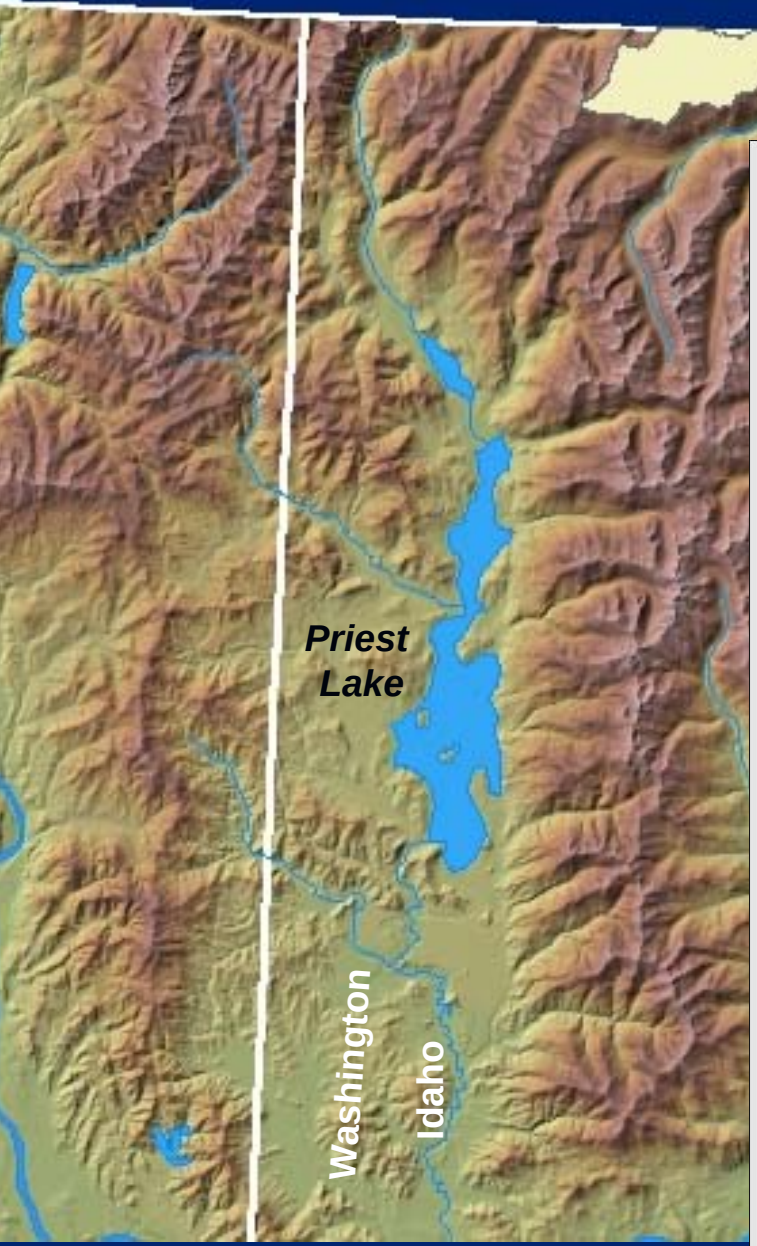
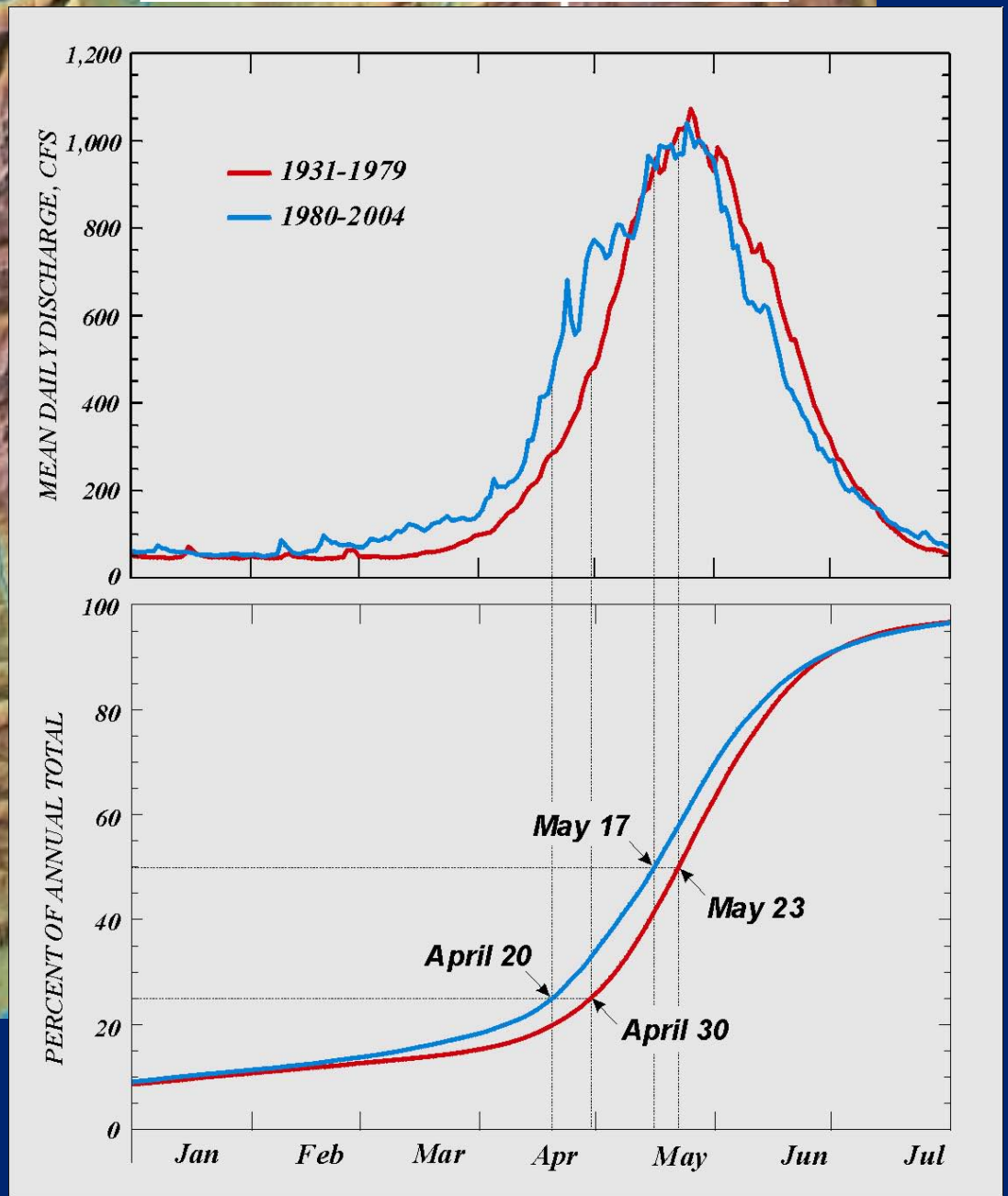
Boundary Creek near Porthill, ID
Kootenai River


50th percentile
p = 0.01
June 1
May 1
July 1
June 1
May 1
Apr 1
Mar 1
Feb 1
25th percentile
p < 0.01
1931-1979
1980-2004


Boundary Creek nr Porthill, 1931-2004
July 1
June 1
May 1
April 1
March 1
50 percent of annual runoff
25 percent of annual runoff
1931-1979
1980-2004
1930
1940
1950
1960
1970
1980
1990
2000
Water Year



Boundary Creek near Porthill, ID



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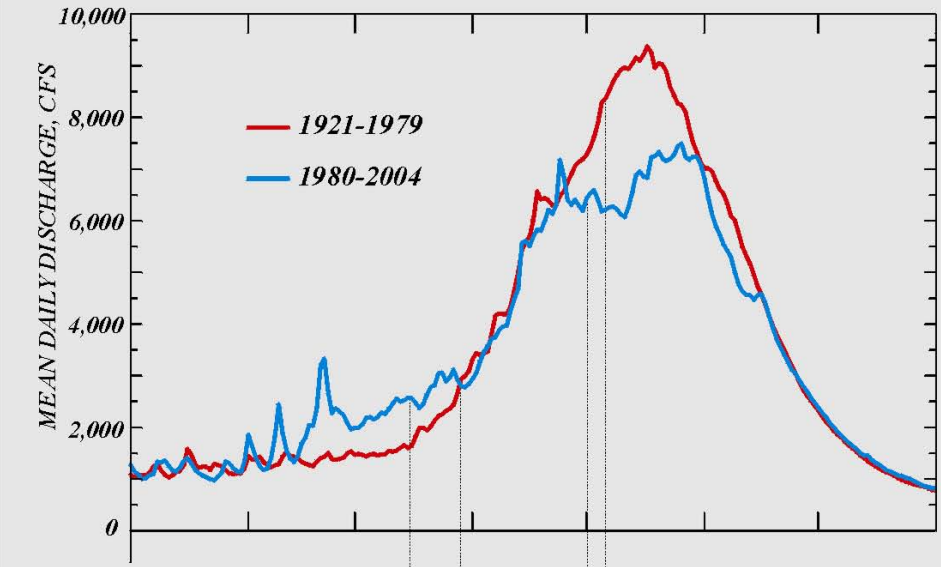

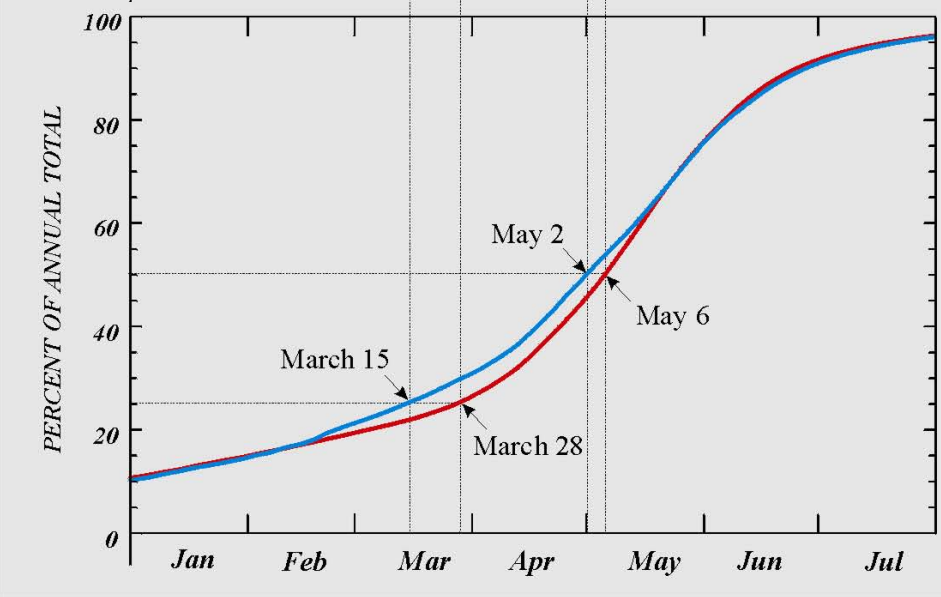

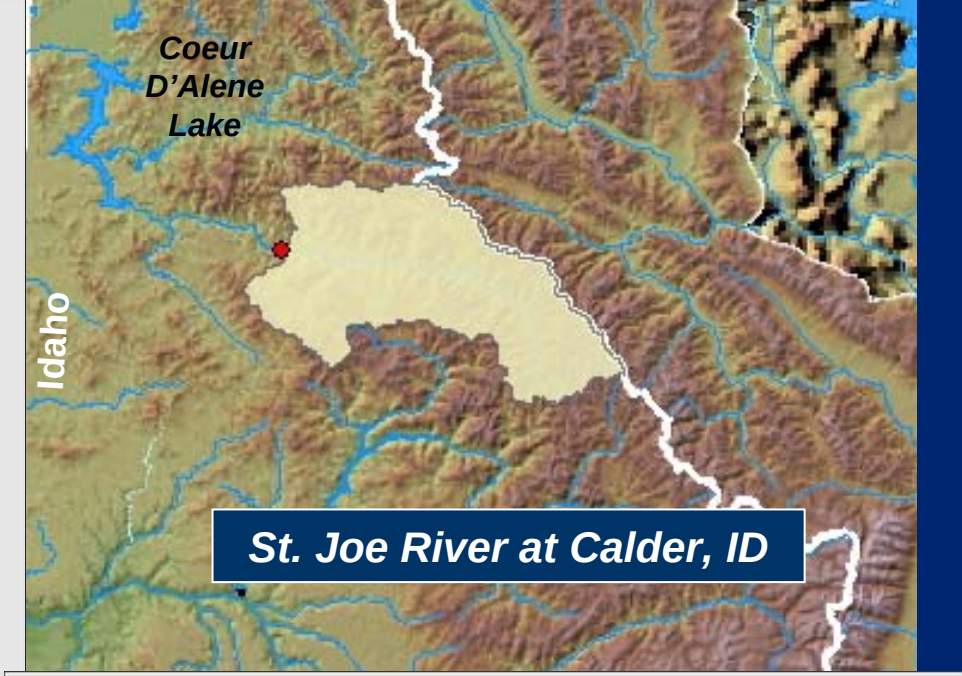

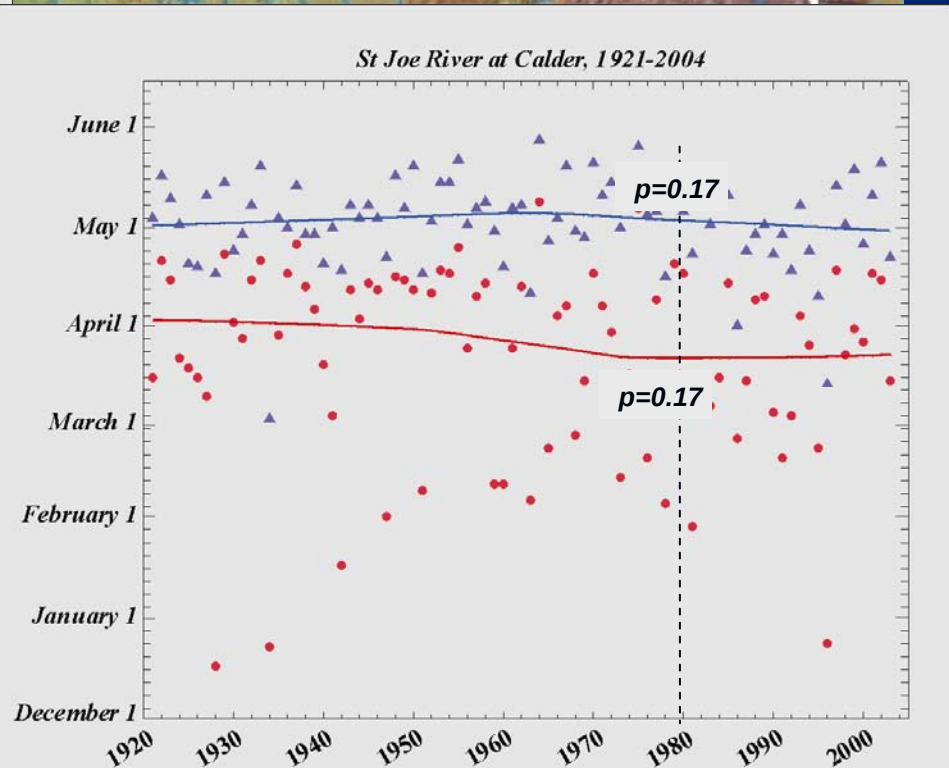

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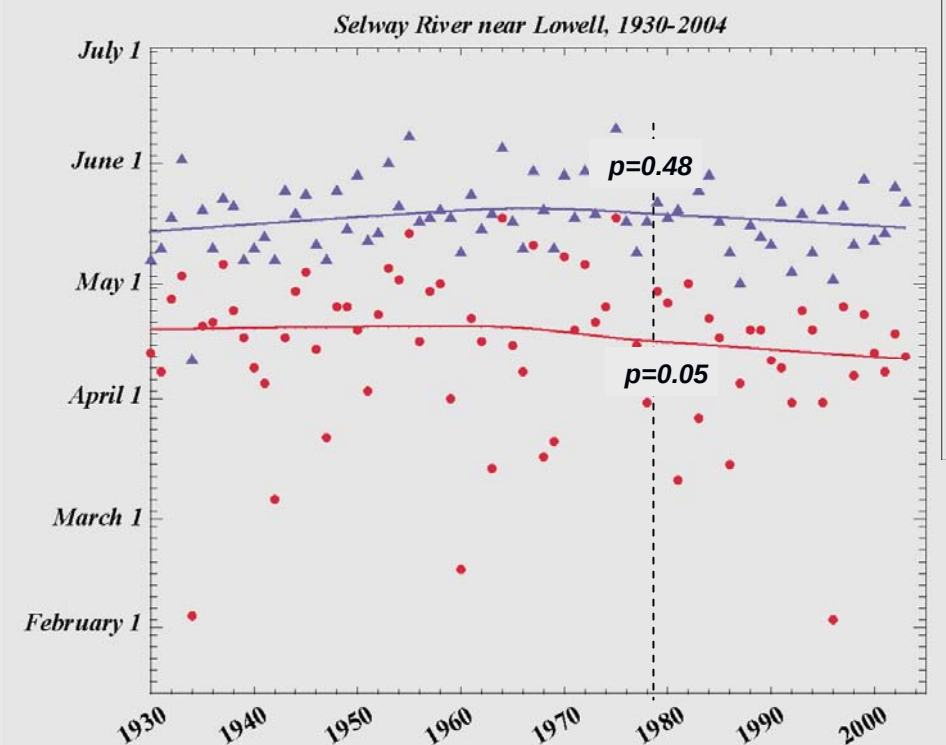
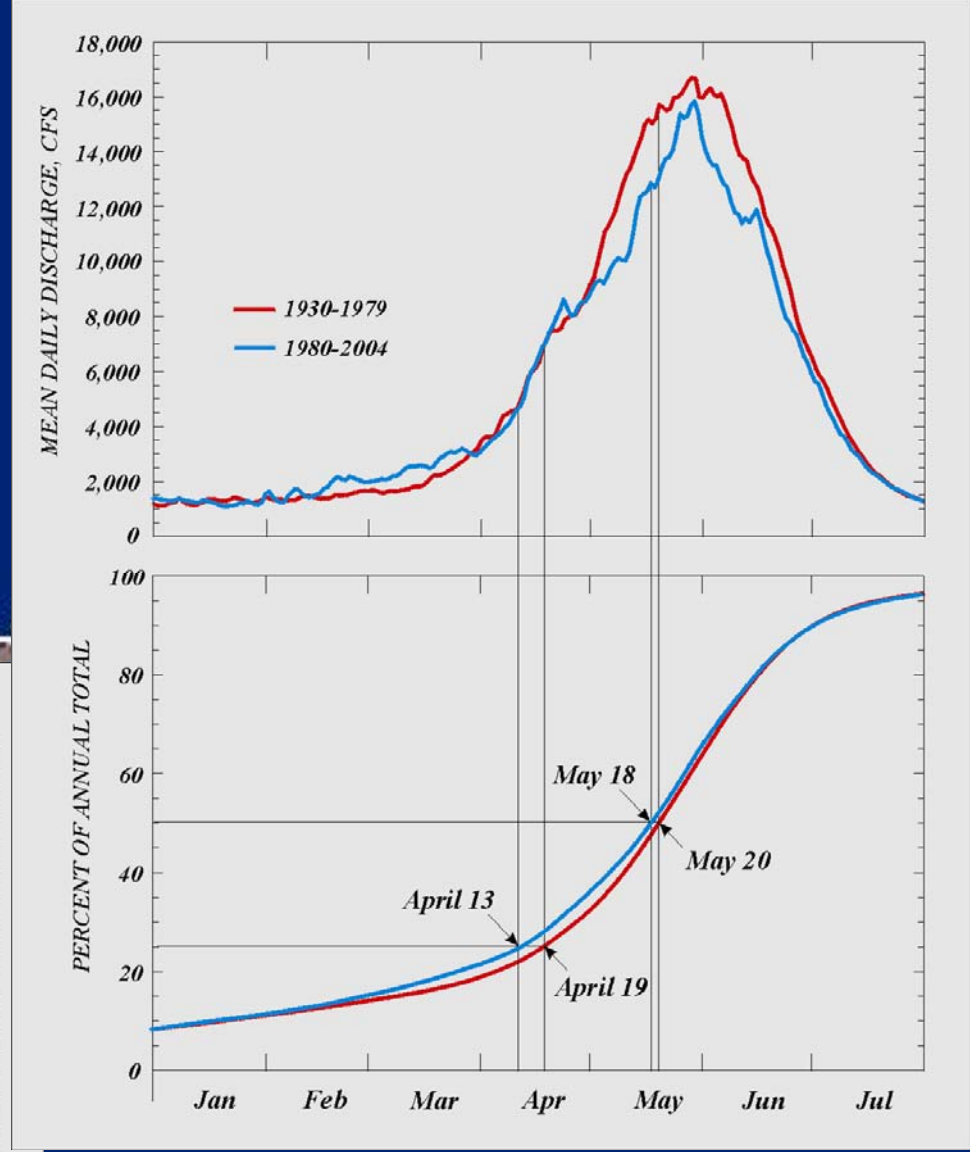
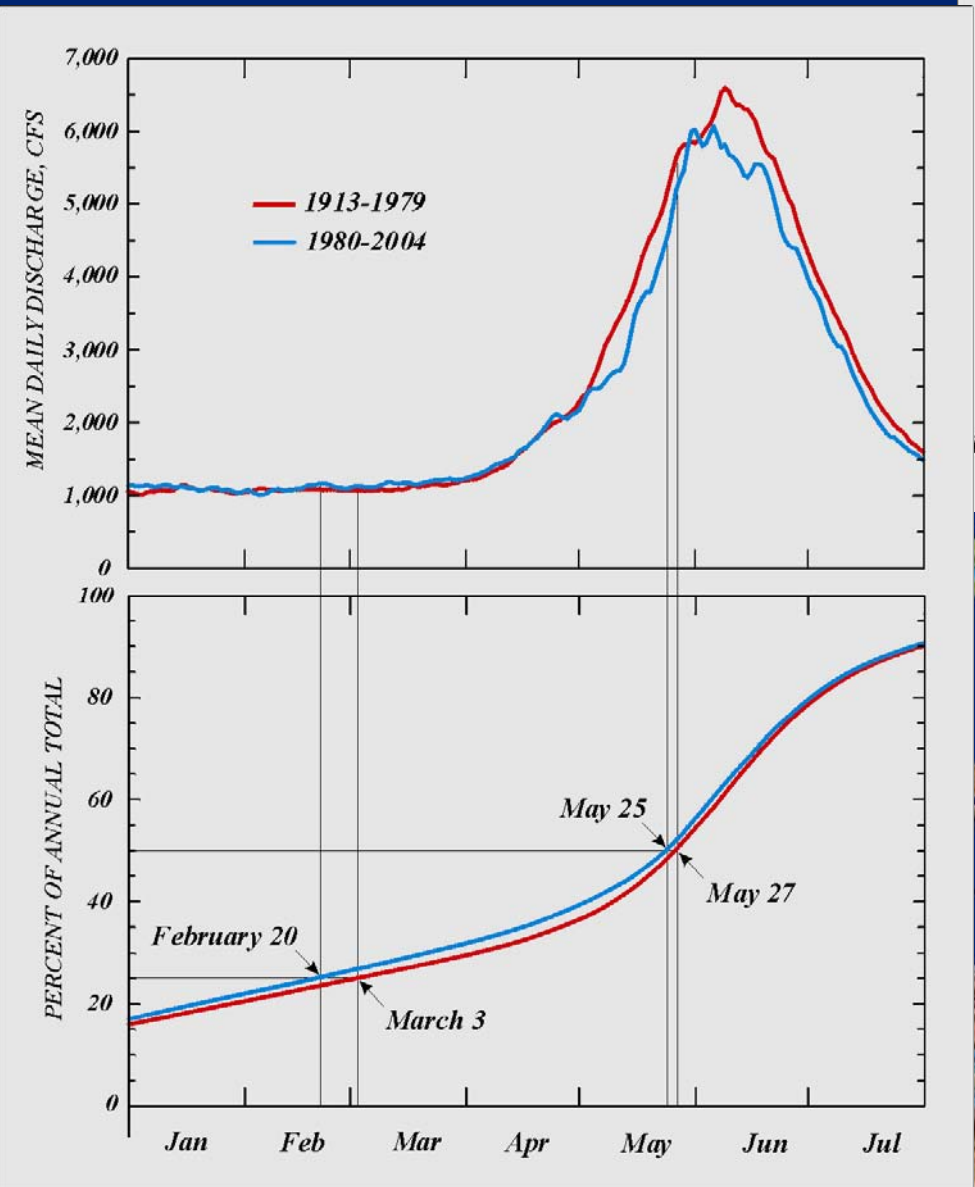
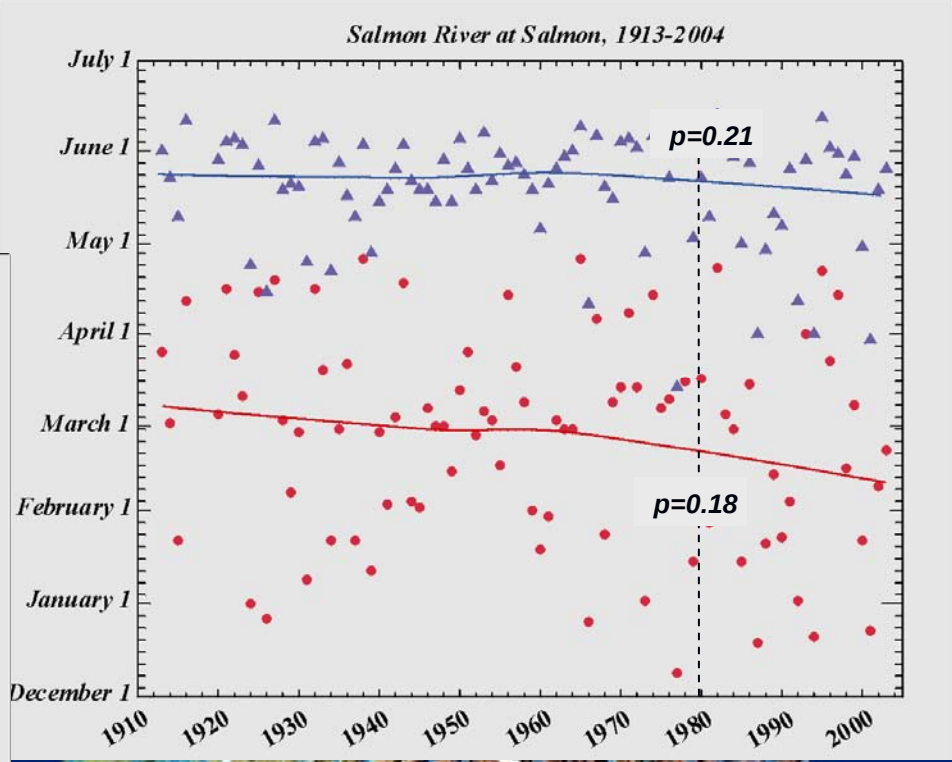
Selway River near Lowell, ID
Lewiston
Kooskia


Selway River near Lowell, 1930-2004
July 1
June 1
May 1
April 1
March 1
February 1
p=0.48
p=0.05
1930
1940
1950
1960
1970
1980
1990
2000

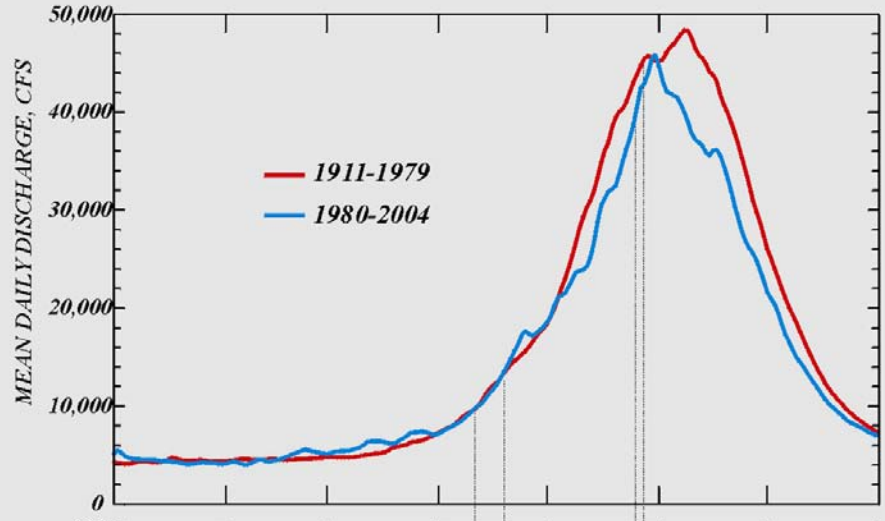

MEAN DAILY DISCHARGE, CFS
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1930-1979
1980-2004
PERCENT OF ANNUAL TOTAL
100
80
60
40
20
0
May 18
May 20
April 13
April 19
Jan
Feb
Mar
Apr
May
Jun
Jul

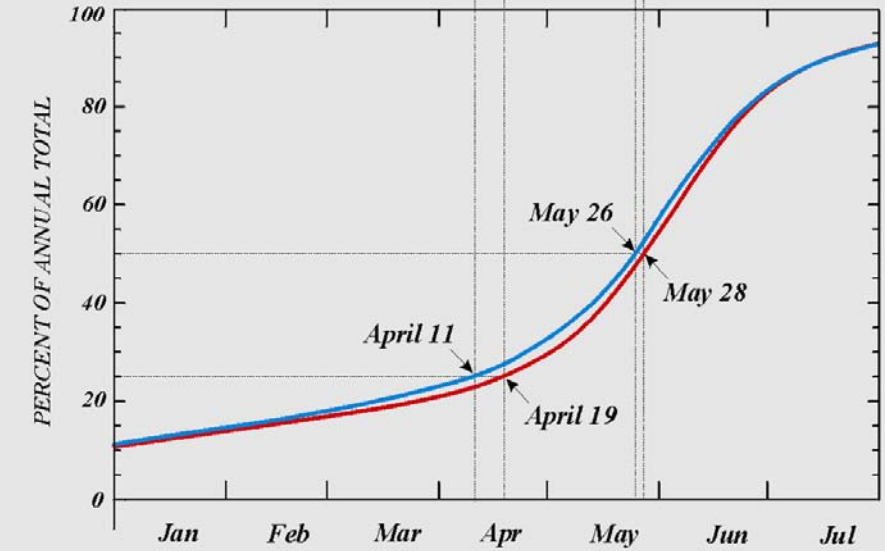

MEAN DAILY DISCHARGE, CFS
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1913-1979
1980-2004
PERCENT OF ANNUAL TOTAL
100
80
60
40
20
0
May 25
May 27
February 20
March 3
Jan
Feb
Mar
Apr
May
Jun
Jul

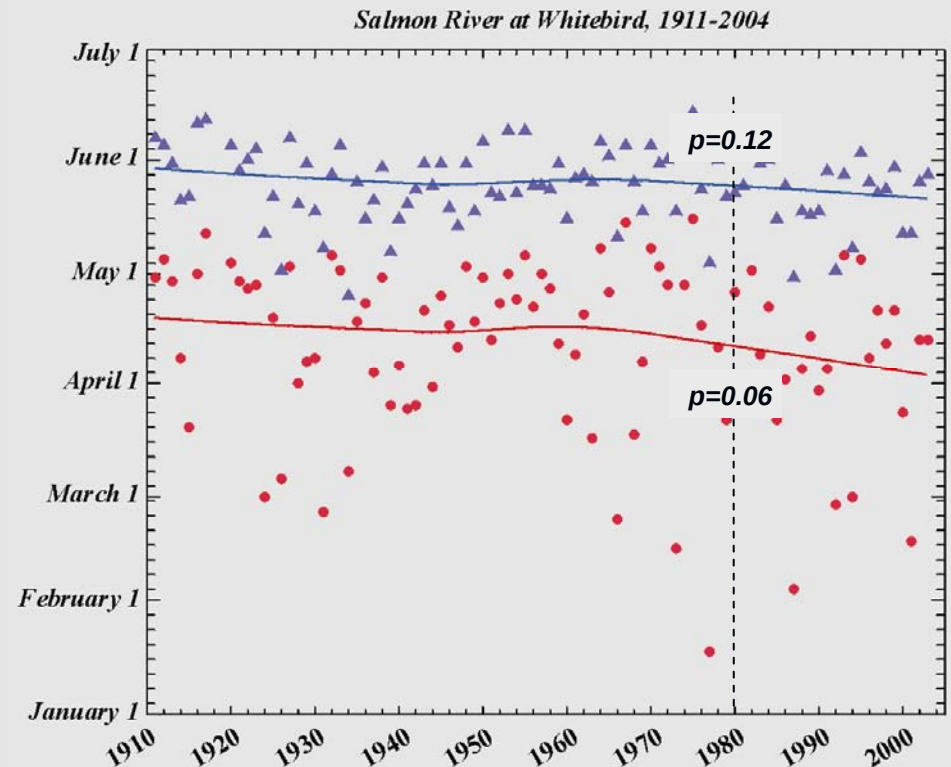

Salmon River at Salmon, 1913-2004
July 1
June 1
May 1
April 1
March 1
February 1
January 1
December 1
p=0.21
p=0.18
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000

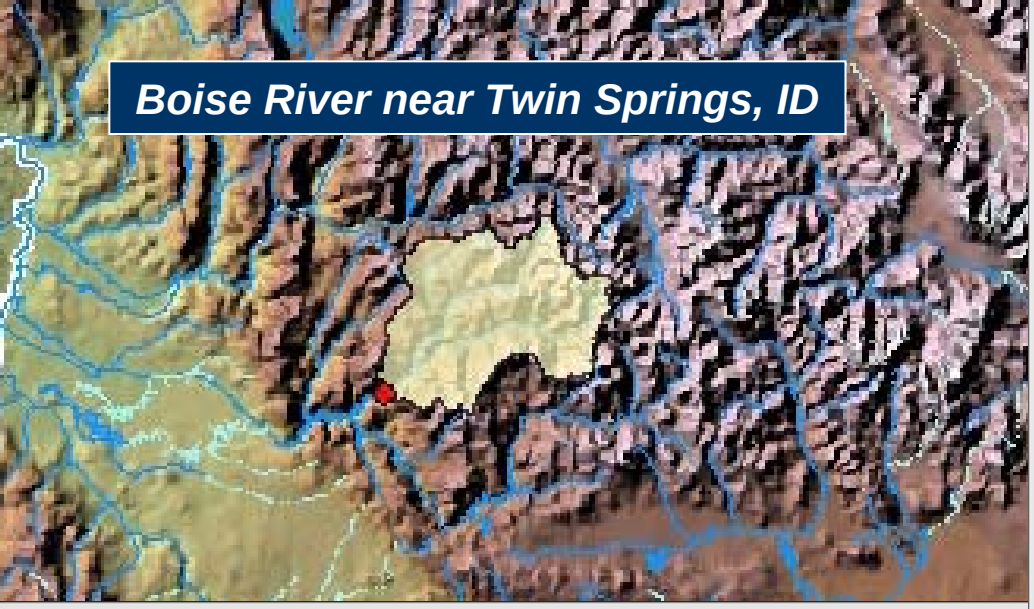

Lewiston
Salmon River at Salmon, ID
Boise
Idaho Falls

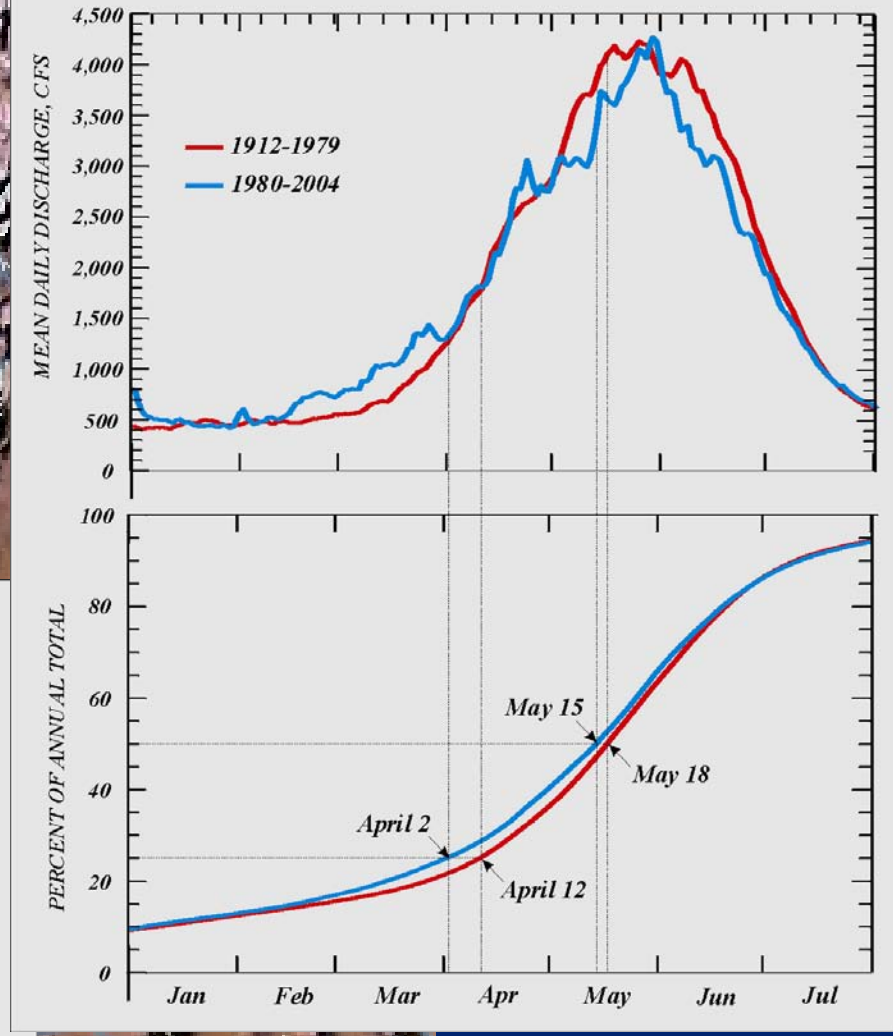

Lewiston
Boise
Salmon River at White Bird, ID

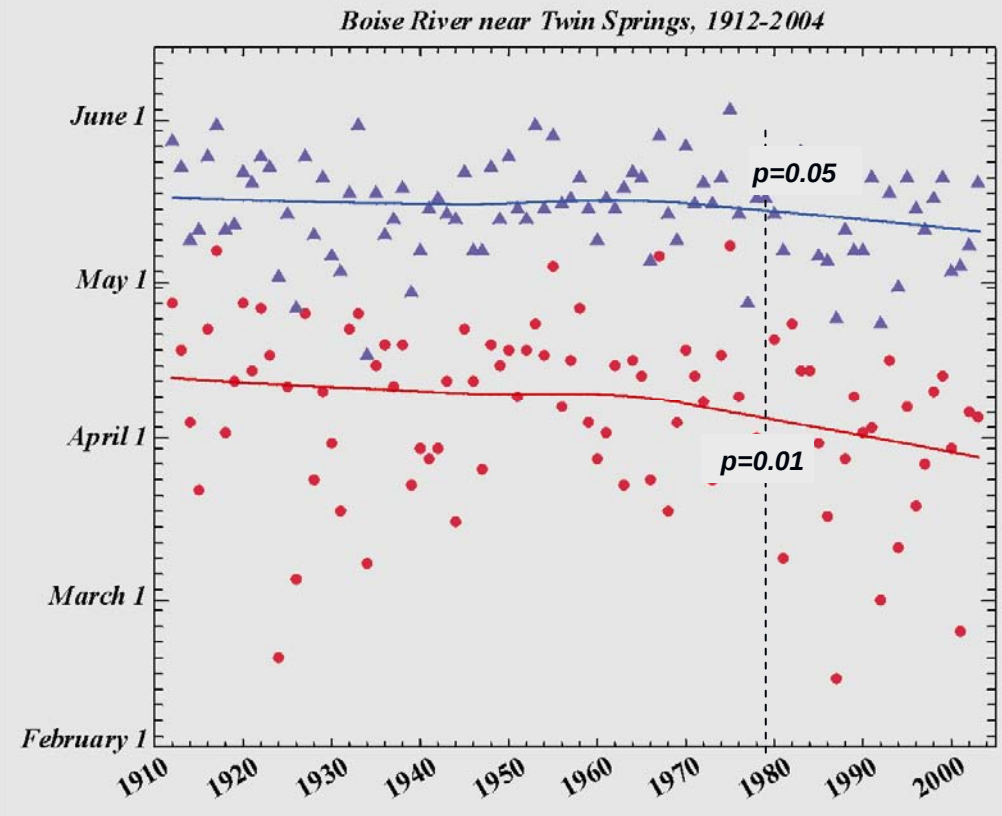

MEAN DAILY DISCHARGE, CFS
50,000
40,000
30,000
20,000
10,000
0
1911-1979
1980-2004


PERCENT OF ANNUAL TOTAL
100
80
60
40
20
0
May 26
May 28
April 11
April 19
Jan
Feb
Mar
Apr
May
Jun
Jul

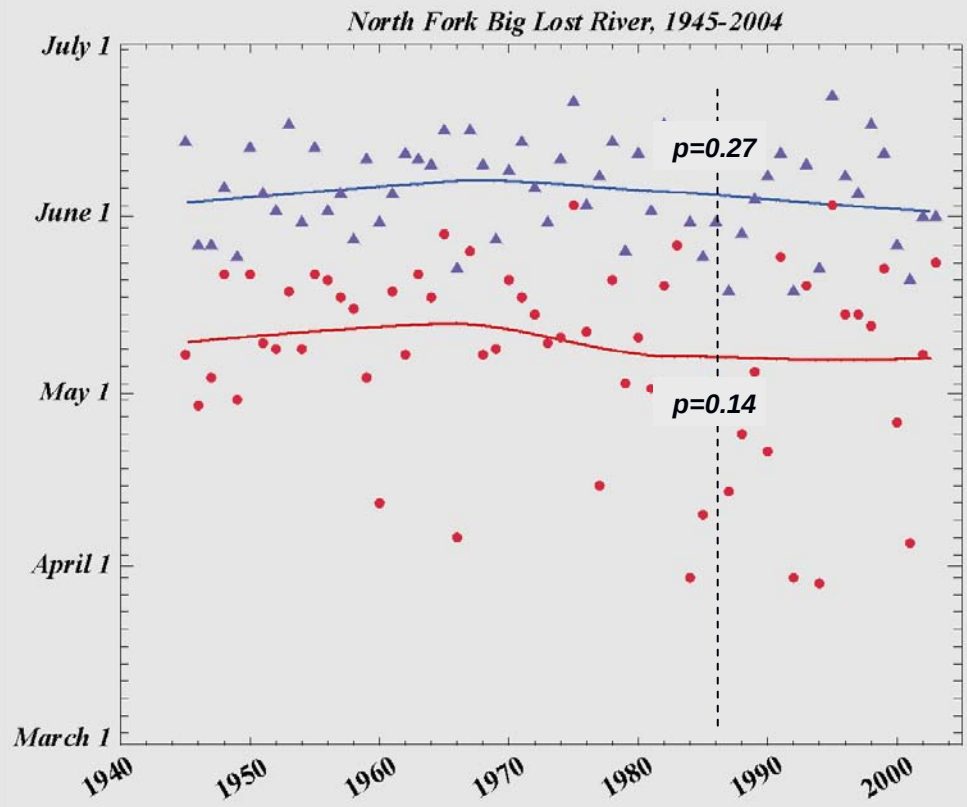

Salmon River at Whitebird, 1911-2004
July 1
June 1
May 1
April 1
March 1
February 1
January 1
p=0.12
p=0.06
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000

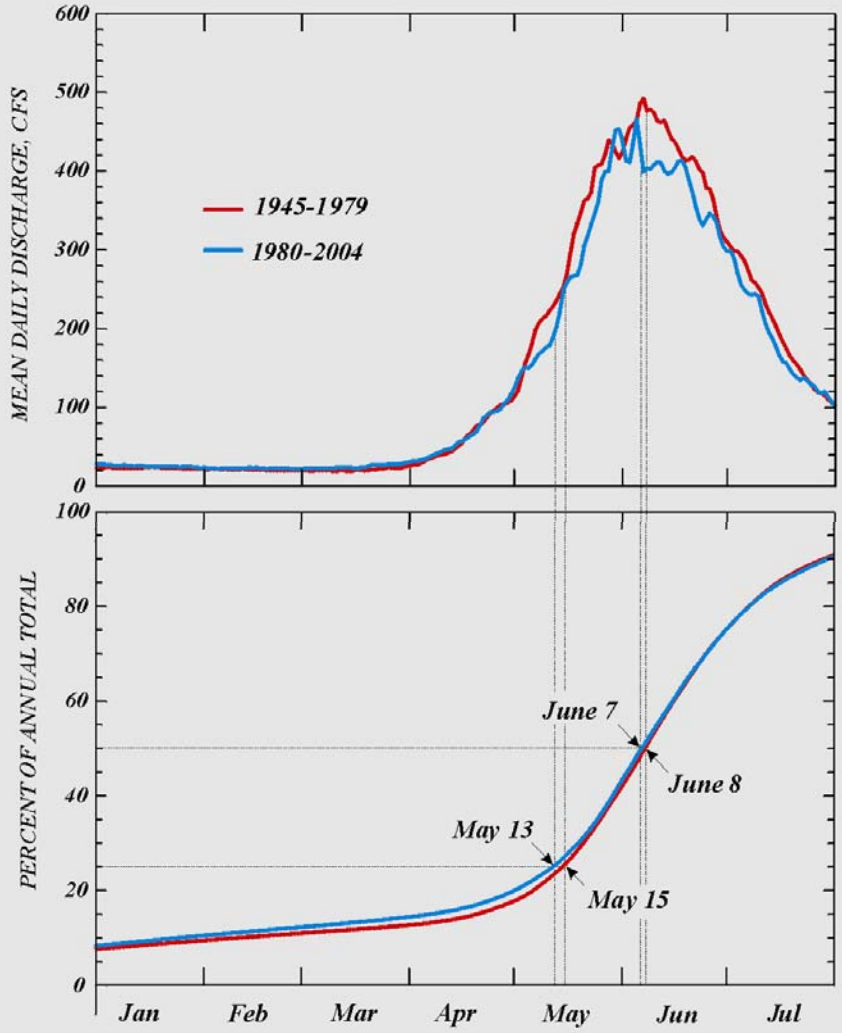

Boise River near Twin Springs, ID

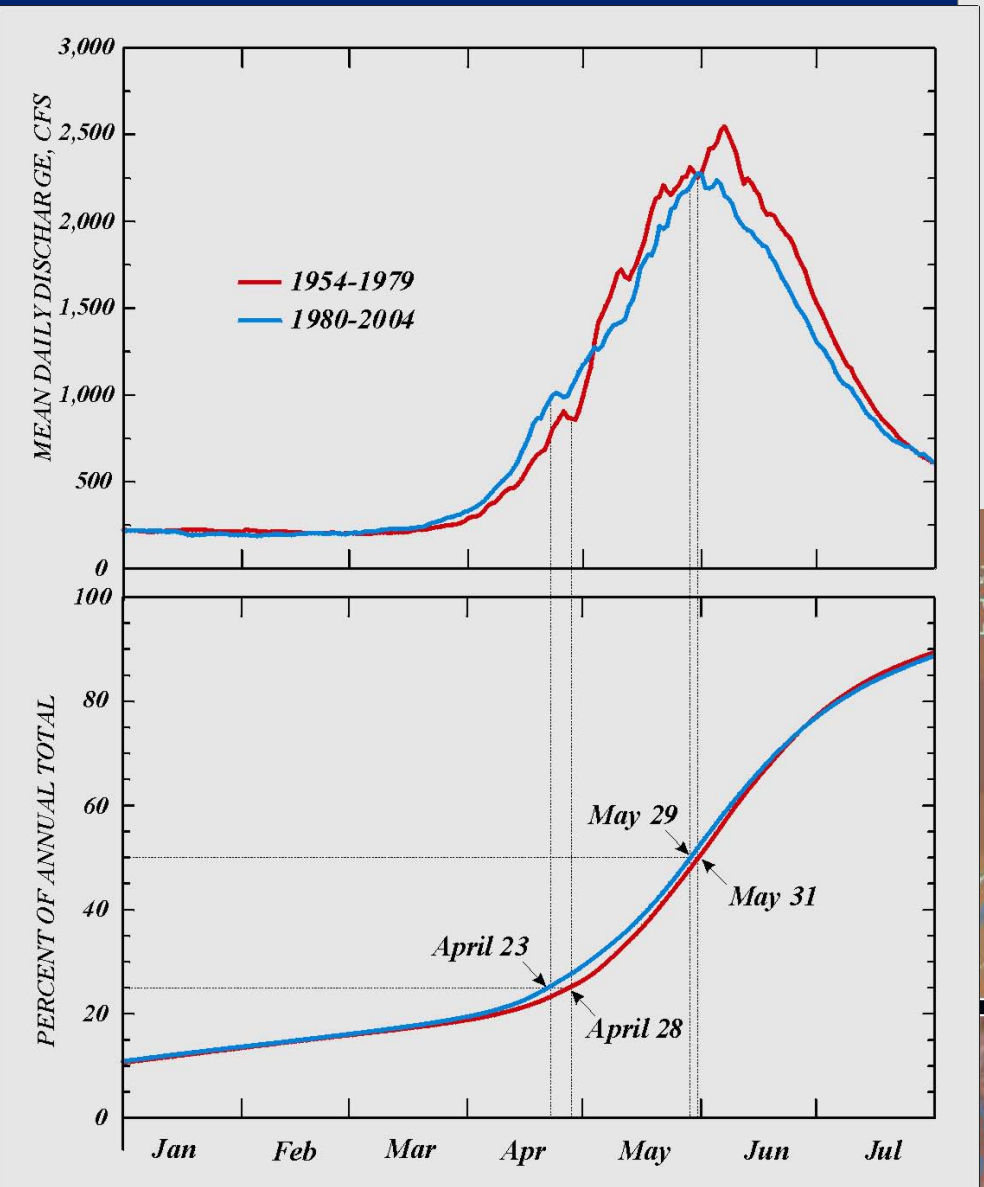

MEAN DAILY DISCHARGE, CFS
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1912-1979
1980-2004
PERCENT OF ANNUAL TOTAL
100
80
60
40
20
0
May 15
May 18
April 2
April 12
Jan
Feb
Mar
Apr
May
Jun
Jul

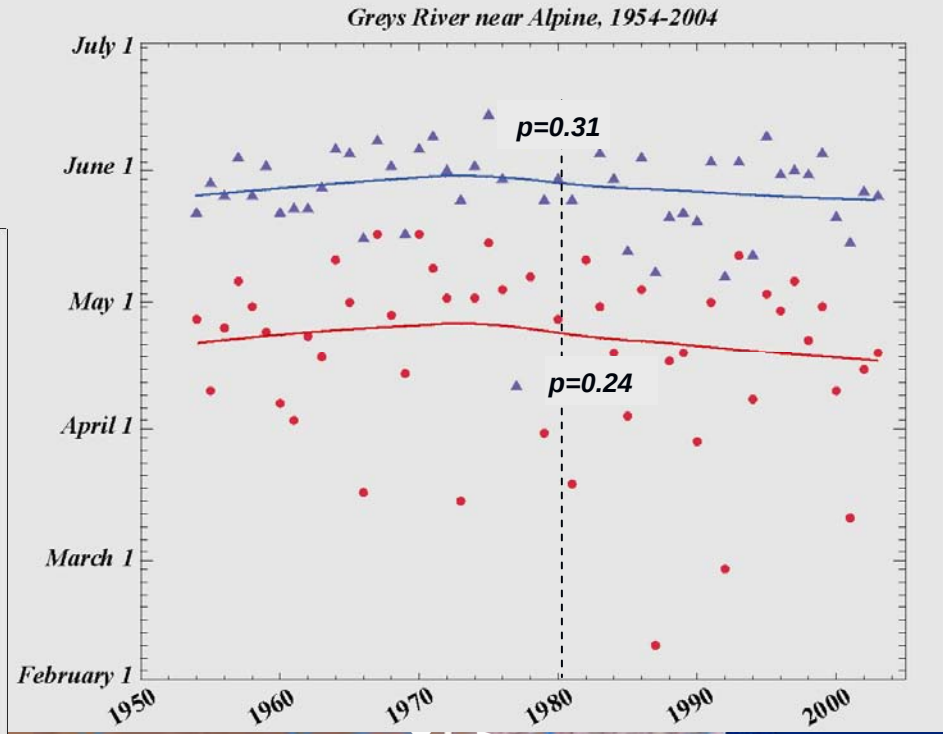

Boise River near Twin Springs, 1912-2004
June 1
May 1
April 1
March 1
February 1
p=0.05
p=0.01
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000


North Fork Big Lost River, ID
Big Lost River
Ketchum

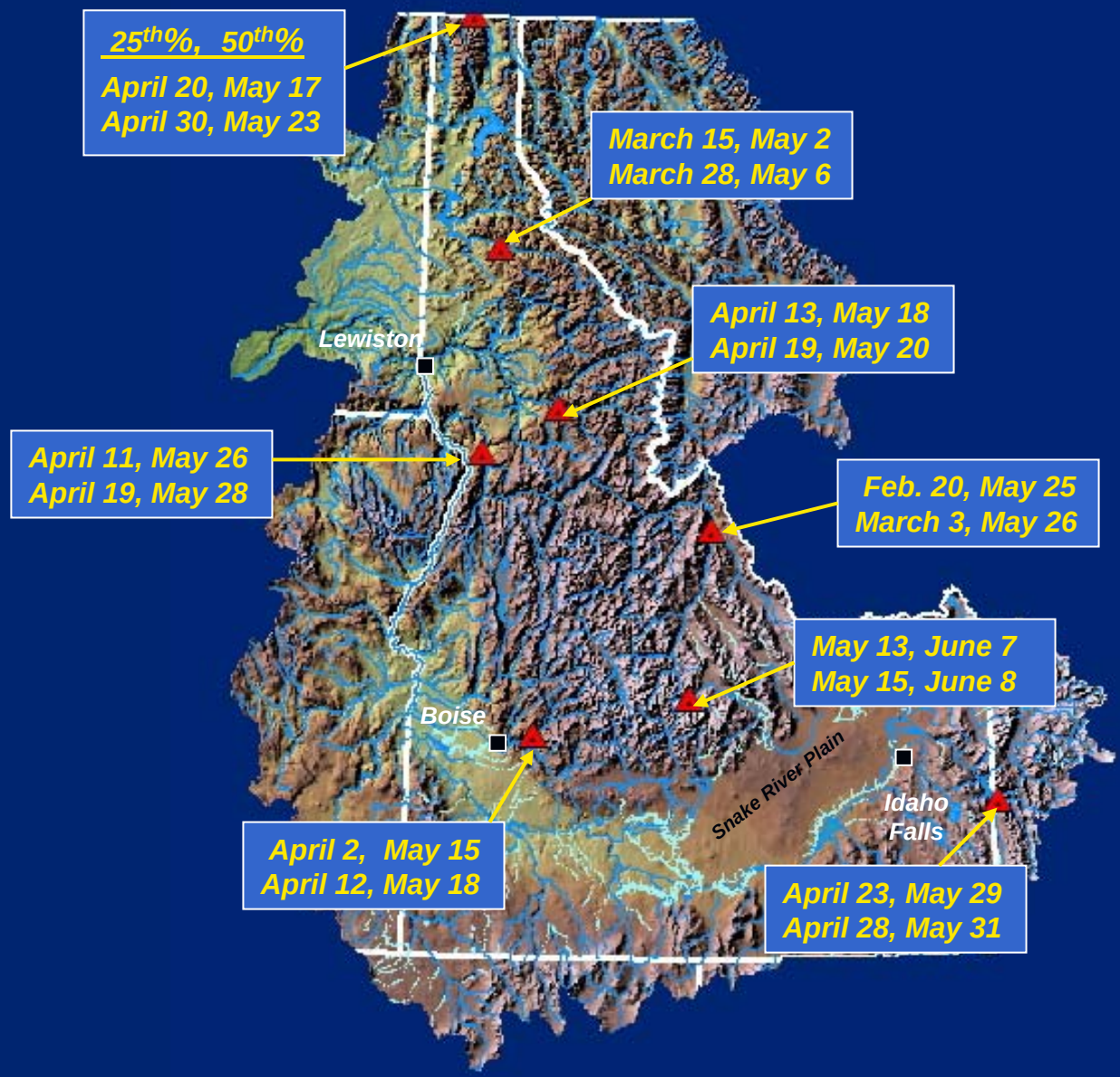

North Fork Big Lost River, 1945-2004
July 1
June 1
May 1
April 1
March 1
1940
1950
1960
1970
1980
1990
2000
p=0.27
p=0.14


MEAN DAILY DISCHARGE, CFS
600
500
400
300
200
100
0
1945-1979
1980-2004
PERCENT OF ANNUAL TOTAL
100
80
60
40
20
0
June 7
June 8
May 13
May 15
Jan
Feb
Mar
Apr
May
Jun
Jul


MEAN DAILY DISCHARGE, CFS
3,000
2,500
2,000
1,500
1,000
500
0
1954-1979
1980-2004
PERCENT OF ANNUAL TOTAL
100
80
60
40
20
0
May 29
May 31
April 23
April 28
Jan
Feb
Mar
Apr
May
Jun
Jul


Greys River near Alpine, 1954-2004
July 1
June 1
May 1
April 1
March 1
February 1
p=0.31
p=0.24
1950
1960
1970
1980
1990
2000


Greys River near Alpine, WY
Falls
Jackson
Pocatello



USGS science for a changing world

Summary

- As a group, the first 5 years of this decade have been some of the driest on record. This is especially evident in central and southern Idaho.
- There is an apparent increase in the variability of annual mean discharge in the last 25-30 years. Timing of runoff also appears to be increasingly variable with runoff occurring earlier as compared to historical patterns.
- Based on the 8 stations examined, on average, the first quartile of the annual runoff occurred between 2 and 13 days earlier during 1980-2004 as compared with the average prior to 1980. The first half of annual runoff occurred between 1– 6 days earlier.
- At a number of the stations evaluated, the earlier onset of runoff has resulted in a decrease in the annual peak discharge and overall flattening of the annual hydrograph.
- Records from long-term gaging stations on unregulated streams are a valuable tool for examining historical changes in stream discharge, basin runoff characteristics, and climatic characteristics.